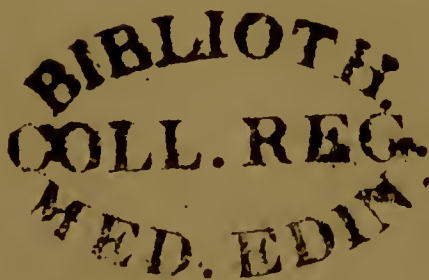


EXAMINATION
OF
PAVON'S COLLECTION

OF
Peruvian Barks

CONTAINED IN
THE BRITISH MUSEUM.

BY
JOHN ELIOT HOWARD, Esq.



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INTRODUCTION.

IN the course of the following examination I have incidentally shown the importance of botanical distinctions as tending to the elucidation of the Pharmaceutical properties of the Barks of commerce: I have also remarked on the unsatisfactory character of the terms generally used for the discrimination of these valuable products of nature: I may, perhaps, be permitted to add a suggestion as to the botanical classification itself; since it is evident that this requires to be made in several respects more complete, if it is intended ever to become generally used in commerce.

I have no doubt that it will ultimately be found needful to divide into a somewhat greater number of species the genus *Cinchona*.

The *Cinchona Condaminea*, as it now stands in the excellent work of Dr. Weddell, comprehends so many, and so varied kinds of the Barks of commerce, that it ceases to be the distinctive term of a species, and becomes that of a *group of trees*—very distinct, if their barks are considered from a Pharmaceutical point of view, although they may be allied if viewed in reference to some of the peculiar features they offer in common to the eye of the observer.

The same remarks would apply to the species *C. micrantha* and *C. ovata*, and perhaps to the *C. cordifolia*, if it be correct that the “ashy crown bark” is included under this head. I should also be inclined to think that the peculiar chemical constitution of the *C. Pelletierana* might plead for its being looked upon rather as a species than a variety.

In the course of this examination I have occasionally given the results of analysis, in so far as the alkaloids were concerned. It is needful to remark that I describe as *Quinine* any *alkaloid* which is soluble in pure ether, which does not crystallize on the evaporation of this medium, and which gives the well known green colour with chlorine and ammonia. Such alkaloids are found in the genus *Cascarilla* (which have been called *Chinovine* and *Blanquinine*); but I am not sure, owing to the small quantity I have obtained, whether they differ from genuine quinine. Such is also the uncrystallizable or “amorphous quinine” of Liebig, which probably exists in this state in the bark itself. I call any *alkaloid* which is soluble in pure ether, and which can be crystallized from this solution *by evaporation*, *Quinidine*. A small portion of cinchonine sometimes dissolves *with* the quinidine, and separates immediately in a crystalline form. This must not

be confounded with the quinidine. The product of *Cinchona ovata a vulgaris*, I have classed under quinidine.

The chief product of the *C. pubescens*, var. *Pelletierana* is *Aricine*, a substance which seems to me to be almost identical with the *paracin* of Winckler. I find, however, that it forms from its solution in pure ether on standing beautiful yellow crystals. These differ entirely both from cinchonine, quinidine, and quinine, and deserve investigation in a medical point of view, as large quantities of this bark enter into the consumption of the country, and the benefit to patients taking this as "Peruvian bark," must at present be regarded as very questionable. It is a *feeble base*, but forms crystallizable salts, the properties of which have been in part described.

The product of the *China bicolorata*, or *Pitayene*, does *not* crystallize, though in other respects it bears a strong resemblance to aricine.

It seems to me a remarkable circumstance, that the product of the *Cinchona Pelletierana* should diverge so greatly from the ordinary product of the genus into the wide spread class of *feeble bases*, and it is curious that the microscopic structure of both varieties of the *C. pubescens* should also be so different from that of other cinchonæ.

The microscopic examination of the structure of the bark will, I am inclined to think, when this branch of the inquiry has been more fully studied, be found of signal utility in the discrimination of species.

It is to be regretted, that we have (as I believe) no examples of any species cultivated in this country, except the *C. calisaya*, which (in its variety β *Josephiana*) flowered beautifully last autumn in the Chiswick conservatories. The consideration of the limited geographical range of this species combines with the appearance of the plants, to make me think there would be much more probability of the successful cultivation of some other species which bear a greater variation of soil and climate, and which are almost equally valuable and interesting. Such are some of the varieties of *C. ovata* and *C. condaminea*, especially the *lancifolia* of Mutis, which is said by Lambert to prefer a rough climate, "the mean temperature of its place of growth being about equal with that of Rome, and the thermometer falling in these alpine forests for hours as low as the freezing point." These species might probably be introduced with more success than the delicate *C. calisaya* into other regions of the world.

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EXAMINATION
OF
PAVON'S COLLECTION OF PERUVIAN BARKS
CONTAINED IN THE BRITISH MUSEUM.

BY JOHN ELIOT HOWARD, Esq.

It is not necessary for me to dwell upon the importance of this collection, both as regards pharmaceutical and botanical science. As the largest *original* collection of Cinchona Barks in England, it merits greater attention than has been hitherto bestowed upon it, and as presenting the results of the labours of those distinguished Spanish botanists by whom the greater part of the present species were named, it affords the opportunity of identifying these with the barks now found in commerce. I refer to the botanical expedition to Peru, which took place in 1777; and lasted eleven years. Messrs. Ruiz and Pavon were appointed to this expedition as botanists; and they were ably seconded in their researches by M. Dombey, a French physician and naturalist of rare merit. When the members of the expedition quitted America, M. Tafalla was intrusted by them with the continuance of their botanical labours and researches†. The published fruits of the Expedition are found in the admirable *Flora Peruviana*, also in the *Quinologia* of Ruiz, and its Supplement, and in the notices of the subsequent labours of Tafalla.

Mr. Lambert received an extensive herbarium, containing nearly the whole of the plants collected by the celebrated authors of the *Flora Peruviana* and their pupils, with "numerous specimens both in flower and fruit, of all the species of the highly interesting genus *Cinchona*," collected by the above-mentioned botanists. He received also part of a collection which was taken in a Spanish prize bound from Lima to Cadiz, part of the cargo of which was sold in London, among which was a fine collection of cinchonæ, purchased by the late Dr. A. Thomson, who gave him duplicates. Mr. Lambert also received from Pavon *fine samples of forty-four sorts of Peruvian barks, with their names.*

These barks and woods, with a large portion of the botanical specimens, were purchased, after the death of Mr. Lambert by the trustees of the British Museum, and are now deposited in the botanical department. They remain in the original

† Lambert's Illustration of the Genus Cinchona, 1821.

packages, and with the labels and descriptions in the writing of the collector, M. Pavon. An important feature in the collection, in connection with the identification of the barks, is presented by thirty-six specimens of the wood of thick branches, with the bark adhering. These are numbered on the wood, and the numbers can still be made out with care; the descriptions are very legible. In referring to the *barks*, I shall follow the numbers attached to the species in Lambert's list†, and when I have occasion to mention the *woods*, it will be according to the numbers found upon these by Dr. Pereira and myself, in an examination of them which we have recently made together. I consider it of the greatest importance to have the assistance of this distinguished physician and pharmacologist, in jointly and attentively deciphering the indications afforded by these valuable materials for comparison. It requires much exercised powers of discrimination to distinguish the different kinds of bark in the varied appearances which the circumstances under which they have grown cause them to assume. Drought and moisture, shade and sunshine‡, so modify the coating, especially of barks, that it would be almost impossible for a person unaccustomed to them, to suppose the origin of such different appearances to be found in one tree. This Dr. Weddell remarked a few weeks since, as regards the *opposite ends* of one long quill of *C. micrantha* in my possession. Still, there are permanent and characteristic marks of distinction, as all who are interested in these products know. It is not, however, sufficiently understood, how important the botanical discrimination of the cinchona is, as I expect will be apparent in the course of this examination, for it has happened in many cases, and to a great extent, that the collectors have substituted the more easily gathered product of one tree of inferior quality for the bark of a cinchona, rich in alkaloids, without the dealers in the article *here* being at all aware of the fraud. In order to assist our opportunities of comparison, I prepared a number of easily portable specimens, which Dr. Pereira and I have placed in juxta-position with those of M. Pavon, and thus were enabled to discriminate more perfectly the barks, almost bewildering otherwise in their unclassified state. M. Guibourt has examined the collection, and has made observations on them, which are partly contained in the 4th edition of his *Hist. des Drogues*, and partly inserted in loose pieces of paper inserted in the boxes containing the barks. It would appear from M. Guibourt's annotations, that numbers were formerly attached to the barks, such is not now the case. Dr. Weddell and M. Batka have also made some observations on the specimens. Other and very valuable standards of comparison are afforded by the collections of barks formerly belonging to Dr. Pereira, and now in the possession of the Pharmaceutical Society, viz., (A) that made under the superintendence of H. von Bergen; (B) those of Dr. Julius Martiny; (C) those sent by M. Guibourt; (D) barks collected by M. Pelletier; (E) bark from M. Marchand; (F) found by Dr. Pereira in English commerce; (G) specimens of barks collected by Poeppig in S. America.

I have also minutely examined the collection of Martius in the new museum of the College of Physicians, at Edinburgh, and have had the great advantage of the identification of those which I have myself collected in English commerce, chiefly by the distinguished naturalist Dr. Weddell, to whom we owe so much in the illustration of this most important genus, and the discovery of the botanical origin of the richest Bolivian species; to M. Guibourt also I am indebted for several valuable hints, as also to Professor Theodore Martius, M. Batka of Prague, &c.

† Page 17, Illustration, &c. The following numbers with asterisks are attached by Dr. P. and myself.

‡ The cinchona trees vary in the shape and smoothness of the leaves, according to the altitude at which they grow, to the severity or mildness of the climate, to the trees standing singly, or being closely surrounded by other plants, to the luxuriance of growth, and greater or less humidity of the soil.—Humboldt in Lambert's *Ill.*, p. 37.

In order to present my observations in an intelligible form, I intend to arrange them under the heads of the different species, as enumerated by Dr. Weddell in his *Histoire Naturelle des Quinquinas*. Omitting then his No. 1, *Cinchona Calisaya*, which has no representative in the collection of Pavon, I commence with

No. 2. *Cinchona Condaminea*.

The botanical specimens of this are numerous, Dr. Lindley reports having examined six specimens in Lambert's herbarium, and fifteen in that of Dr. Thomson, many of them very fine ones†. Dr. L. says generally, "for my own part I have botanically followed Ruiz and Pavon step by step with their own specimens, and many others before me, and I am bound to say that, in my opinion, they are entitled to the greatest confidence for care and accuracy‡." We may be pretty well assured therefore at the outset, that this tree could not have escaped their notice, since it constituted, as determined subsequently by Humboldt, the most important and most valued Loxa bark§. Humboldt says || his plant is "very positively the same as that which was represented by La Condamine," that he has "compared his specimens taken at Loxa with those sent from Peru by M. Joseph de Jussieu, and with those of M. de la Condamine. They all belong to the same species, and are remarkable for the small pit or hollow (*enfouissement*) which is observed in the leaves, in the axils of each principal nerve. It is on this hollow, which was not observed by La Condamine, that we establish the specific character of this first species."

M. Humboldt says further¶, "whoever determines single specimens of dried collections, and has no opportunity to examine or observe them in their native forests, will be led to discover different species by leaves which are of one and the same branch. Even the laurel-leaved *C. Condaminea*, the finest bark from Uritusinga, has very diversified leaves, according to the altitude at which it grows, and which equals that of St. Gothard, or Mount Etna. It would deceive the bark-peelers themselves, if they did not know the tree by the glands, left so long unobserved by botanists."

One thing then is evident, and it is the important feature in the commercial point of view, that this celebrated naturalist described and figured the tree which produces the *finest old Loxa bark* as the *C. Condaminea*. M. Guibourt, however, says the *C. Condaminea* of Humboldt differs, in some respects, from the cinchona described and figured by La Condamine, and approaches more nearly to the *C. lancifolia*, of which a distinct species is made. Dr. Weddell unites under this head five varieties: *a*, vera; *β*, Candolii; *γ*, lucumæfolia; *δ*, lancifolia; *ε*, Pitayensis; and says, doubtfully, "not having seen any of the varieties of the *C. Condaminea* in a living state, it is not without hesitation that I have adopted the distribution which I have just presented||". He says further, "it would above all be desirable to compare well together the bark of these trees on individuals of the same age. It is in my opinion the most infallible touchstone to pronounce on the affinities of species of this genus."

Now, in comparing the barks of Ruiz and Pavon, we find several varieties, distinguished by these botanists by different names, which seem to represent the one *C. Condaminea* of Humboldt. Weddell gives three of their names under the first head *a*, vera; and amongst these the Uritusinga (parrot's beak), so called from a mountain in the vicinity of Loxa, where the choicest bark for the royal pharmacy of Spain continued to be gathered in the time of

† I am indebted to the Museum d'Histoire Naturelle for the following specimen: of *a vera*, one, of Bonpland's collection, and one of M. Rivero's; of *lancifolia*, one of the specimens given by Mutis to Humboldt; of *Candolii*, one specimen of the collection of Pavon, given by Rivero; *lucumæfolia*, one specimen given by M. Rivero from Pavon's collection.

‡ M. la Condamine described the first sort known, that which is most esteemed in commerce, and which is generally known in commerce under the name of *cascarilla fina*, pl. eq., i., 36.

§ Lindley's *Fl. Med.*, p. 409.

|| Pl. Eq., vol. i., p. 36.

¶ On the *Cinchona Forest of South America*, by A. Von Humboldt, in Lambert's *Ill.*, p. 36.

|| Page 39, *Histoire*, &c.

Laubert†) which certainly designates the finest and the original Loxa, or crown bark. M. Lambert shows, however, that varieties of this most precious Loxa were known and used in the royal pharmacy. There was at least the *amarilla* and the *roxa*, the yellow and red, proceeding from varieties of the same tree. The red variety (perhaps from the elevation of its place of growth) is described as only "about three yards" in height.

Both these varieties are represented in the collection, and belong, as far as we could judge, to the general head, *C. Condaminea*. Guibourt and others concur in this affiliation.

On the *botanical* part of the question it is not my intention to remark. The *C. Condaminea* might either be restricted or extended, so as to include all the varieties of *C. lancifolia*, growing in New Granada, as well as those of Peru; but the commercially important feature is this, that these barks belong altogether to the better description of barks, if we are to judge by the quantity of the different alkaloids which they contain, and have, therefore, come into use pretty freely in the manufacture of quinine and cinchonine, owing to the high price of the very superior barks of Bolivia. They possess moreover certain physical characteristics common to the whole range of this most extensive and most varied species.

Of all the varieties the original *C. Condaminea* is probably the richest in alkaloids; but as the tree was so wastefully cut in Peru that, according to Humboldt, 25,000 trees were destroyed (before 1779) in one year, it has apparently become scarce. Still, I think, it sometimes comes into commerce. M. La Condamine says, "in 1640, the Count and Countess of Chinchon having returned to Spain, their physician, the Dr. Juan de Vega, who had followed them, and had brought back a quantity of quinquina, sold it at Seville at 100 reals the pound. It continued to have *the same sale* and the same reputation until the trees of quinquina not barked having become scarce, the inhabitants of Loxa, in their thirst for gain, and having no means of supplying the quantities which Europe demanded, *mixed different barks* in the quantities exported to the fairs of Panama, in the time of the galleons, which having been found out, the bark of Loxa came into such discredit that people would not give one piastre the pound, whilst formerly four and six piastres had been given at Panama, and twelve at Seville. In 1690 a very large quantity remained at Piura and on the quay at Payta, which is the nearest port to Loxa, without any one being willing to export it; which circumstance commenced the ruin of Loxa, this place having become as poor as it was opulent in the period of its flourishing commerce. Amongst the barks which are often mixed with that of the quinquina, one of the chief is that of *alizier*, which has a more styptic taste, and a colour redder within and whiter without: but that which is most deceptive is a bark called *cucharilla*, from a tree common in the country, which has no resemblance to the quinquina, except in its bark. It is nevertheless discovered, and connoisseurs are not deceived. It is in all probability the bark which we call *chacril*."

† Laubert was chief physician to the Spanish army, and wrote a memoir on the different species of quinquina, translated and published by Lambert. He says (Lambert's *Ill.*, p. 62), "the quinquina de Loxa used in the royal pharmacy was procured latterly from the mountains of Uritusinga, Guatizinga, and Caxamuna; practitioners having found *by experience* that it is preferable to that gathered at Quito, Jaen de Bracamoros, Cuenca, and other places. D. V. Olmedo*, a distinguished botanist, was appointed by the King to superintend the collection and desiccation of this precious bark. This quinquina, *Cascarilla amarilla*, known also in Peru by the name of *Cascarilla de Loxa*, is the genuine cinchona of Ruiz. The tree to which it belongs grows in the provinces of Loxa, Cuenca, Jaen de Bracamoros, and others. This bark is slender, about the size of a goose-quill, pretty well rolled, and covered with a slight thin epidermis of a fallow grey. Its internal surface has the fineness and *aspect of Ceylon Cinnamon*, its fracture is very clear, except on the inner side, which presents little fibrous filaments extremely fine; its smell, which is considerably aromatic, becomes perceptible on pulverization or decoction; its bitterness is successively developed by a prolonged mastication, but it is always very inferior to that of the calisaya, it is also styptic; but without acerbity."

* To this gentleman Humboldt refers as having given him information under the head *C. Condaminea*. *Pl. Eq.*

I should be inclined to bring together, under the general head of *C. Condaminea*, Weddell, the following barks in the collection† :—

a. vera.

- | | | |
|------------------|---|--|
| The Yellow | { | No. 32. Quina <i>amarilla</i> fina del Rey, de Loxa. |
| | | No. 44. Cinchona cascarilla <i>amarilla</i> del Rey, de Loxa. |
| | | No. 41. C. cascarilla <i>amarilla</i> , Uritusinga. |
| The Red | { | No. 31. Quina <i>colorada</i> del Rey, de Loxa. |
| | | No. 45.*Cinchona <i>colorada</i> de Huaranda, sp. nov. inedita, es buena, marked also on the wrapper, Quina <i>colorada</i> del Rey, de Loxa. (Cinchona succirubra of Pavon, MSS.) |
| | | No. 20. Cinchona <i>colorada</i> , de Jaen. |
| | | No. 39. C. cascarilla <i>colorada</i> de los Azogucs de Loxa. |
| | | No. 40. C. cascarilla <i>colorada</i> de Loxa. |
| The Grey-Brown | { | No. 68.*Cinchona <i>colorada</i> de Jaen, es buena, sp. nov. inedita (Cinchona conglomerata, Pavon). |
| | | No. 33. Cinchona cascarilla <i>chaharquera</i> ‡, de Loxa. |
| | | No. 46.*Quina <i>chaharquera</i> de Loxa. |
| | | No. 3. Cinchona cascarilla fina de Loxa. |
| | | No. 60.*Cinchona sp. nova de Jaen en Loxa, es buena corteza. |

β. *Candolii*.

- | | | |
|----------------|---|---|
| The Black..... | { | No. 4. Cin. cascarilla de Quiebro de Cuenca de Loxa. |
| | | No. 34. Cinchona quina <i>negra</i> de Loxa. 1°. Especc quina <i>negra</i> . 2°. Espece cinchona de Loxa. |

γ. *lucumæfolia*.

- | | | |
|-------------------|---|---|
| The Silvery | { | No. 55.*Quina con hojas de Lucuma, 1° Esp. |
| | | No. 10. Cascarilla con hojas de Lucuma. 2°. Esp. de Loxa. |
| | | No. 36. Cinchona quina con hojas de Zambo de Loxa. |
| | | No. 56.*Quina hoja de Zambo de Loxa. |
| | { | No. 22. Cascarilla crespilla de Latuna de Loxa. |

δ. *lancifolia*.

- | | | |
|-------------------------------|---|---------------------------------|
| The Fibrous
Orange Red ... | { | No. 37. Quina estoposa de Loxa. |
|-------------------------------|---|---------------------------------|

The Motley coloured—ε. *Pitaensis*.

If this review be correct, we have at once more than one quarter of Pavon's sixty-nine specimens arranged under the head of this one species of

† I had in part completed the following arrangement before I met with that of M. Joseph de Jussieu, which seems to place the matter in a clearer light. M. Jussieu followed the steps of La Condamine at Loxa in 1739. His description of the genus agrees with that of M. La Condamine, but he admits a larger number of species, which may be reduced under two principal heads, of which the others are only varieties. The first comprehends *the red, the yellow, and the knotty*, which all have very smooth leaves, purple flowers, almost without smell, and the bark bitter, more or less coloured. Of these three, the most esteemed is the *red*. It is that which, employed from the first, had produced such speedy effect, which had acquired for it a merited celebrity. It became at length so rare, that M. de Jussieu found only some trees in the environs of Loxa. They have been obliged to substitute the *yellow* or the *knotty*, which the Spaniards of Peru even prefer, because they regard them as less active and heating. In spite of this national preference, our author does not hesitate to decide for *the red*, the efficacy of which he proved in his own person, and which he regards as infinitely superior.—*Histoire de la Société Royale de Médecine*, 1782. [The fine red bark of commerce is rich in alkaloids.]

‡ *Charque* is the Indian term for *dried meat*, whence in Bolivia the term *charquesillo*, for the bark intermediate between the *tabla* (flat) and *canuto* (quill). The colour of the Bolivian *charquesillo* is similar to that of the *chaharquera*. I do not know whether the words are as similar in meaning as in sound. The term *knotty* (nouveux), employed by Jussieu for, as I conclude, the *chaharquera*, may very well indicate the peculiar and characteristic *warts*, which, from a very small size, increase till they become great prominent rugosities, nearly an inch in length; intermediate, at times they resemble in shape a coffee-seed, with a deep longitudinal fissure running down the middle.

Weddell†. The general character is that of the varieties of the *Quinquina gris brun de Loxa* of Guibourt, of which specimens are in the Pharmaceutical Society's collection. This M. G. himself identifies with the "fine yellow Uritusinga" bark in the collection, having marked No. 32 above, on a paper inserted in the box, "*Quinquina gris brun de Loxa*," a very descriptive name for its general appearance, and, perhaps, still more applicable to the chaharquera sorts.

We should, on this supposition, have made out clearly, in accordance with all the best authorities, that the *fine Loxa* bark of M. Guibourt is derived from *C. Condaminea*; but if we conclude from this that it is the origin of the finest crown bark of English commerce, because "Loxa" and "crown bark" are used as convertible terms, we should commit a serious botanical error.

The history of "*Crown Bark*" is this. It received this name in consequence of its use by the royal family of Spain. In October, 1804, a Spanish galley returning from Peru was taken by our countrymen off Cadiz. Among the treasures found therein were many parcels of Cinchona bark, two sorts of which were distinguished from the others by their external appearance and mode of packing. Two of these chests were marked "*Para la real familia*" (for the royal family), and were lined so carefully with sheet iron, that the gross weight of the package doubled that of its contents‡. The bark presented a surprisingly fine appearance: it consisted of unmixed fine quills about thirteen inches in length, which were tied together by means of bass in bundles of about three inches diameter. This is described by Goebel as the produce of *C. Condaminea*, and as differing from the present crown bark.

Just such a parcel of "fine old Loxa" quills, turned up among old stores at the London Docks, and was sold in 1850. It had traditionally remained twenty-five or thirty years there, and the packages were all decaying with age, so that it might even have been part of the parcel above referred to. Of this I obtained a portion. The packages contained (*a*) quills of fine Loxa tied up in bundles as described above; (*b*) quills resembling the specimen of *Q. gris fibreux royal d'Espagne*; (*c*) large thick heavy quills of *Condaminea* bark. Of (*a*) and (*c*) I obtained good specimens, and have examined them in reference to the quantity of alkaloids contained, which I found to be per cent. for (*a*): Quinine .714, Quinidine .514, Cinchonine .04.

This was from the smaller quills, and under the disadvantage of age, &c. The larger and stouter quills (*c*) are richer in alkaloids, especially in cinchonine I conclude, therefore, that the old original "crown bark," the fine Loxa of Uritusinga, was one which well merited its character, on account of the quantity of alkaloids contained, which (*taking the whole together*, for the bark is rich in cinchonine, and calisaya is not) equals the *sum total* of alkaloids in some specimens of good Calisaya bark.

Contrasted with this, the result of an examination of some very fine "*crown bark*," the best then in the market (in 1850), I found the produce of this to be per cent.: Quinidin, finely crystallized from ether, .57, Cinchonine .06.

I have again this year tried another sample of very beautiful "H O" bark, and obtained as per cent.: Quinidin, crystallized from ether, 1.05, Cinchonine .08.

The "H O" and a crown were brands adopted in the time of the Spanish dominion for two different sorts of bark, which are both included now under the general title "crown bark."

This was in larger quills, and the large quills must always be expected to contain more alkaloid than those which consist almost entirely of outer coat§. So

† Humboldt describes only four cinchonæ, two of which are now removed from this genus. The authors of the *Flora Peruviana* depict thirteen, of which eight are still recognized as cinchonæ.

‡ Goebel, *Ph. Waar.*, i., p. 35.

§ La Condamine says, "They told me at Loxa, that *anciently* they preferred the *largest barks* (*les plus grosses ecorces*) which were put aside with care as the most precious, *now*, the smallest are preferred. One may suppose that the dealers find their advantage in this, because the fine quills go in a smaller compass. But a director of the English South Sea Company at Panama,

that we have not only the substitution of barks poorer in alkaloids for the old *Loxa* richer in alkaloids, but we have β quinine or quinidin substituted for quinine, if this be of any importance.

I find that this view is in part confirmed by Von Bergen, who says, under Pl. vi., "After all the trials, the results of which are comprehended in this table, were completed, there arrived, by way of *Cadiz*, a parcel of *Loxa* bark, which, without being particularly heavy, was particularly distinguished, as containing the unmixed precious article. It appeared to me very interesting, that the contents of this *Loxa*, for which 4 marks banco per lb. were willingly paid, should be ascertained, and compared with those kinds which recently are accustomed to be found in what comes by way of *London*, of a mixed *Loxa* of very different kind of bark, the price of which has fallen to 44 schillings banco. The result was, that the *Cadiz* bark contained in 100lbs., \pounds 4.583, but the common *Loxa* from *London* in 100lbs., only \pounds 3.862." (Of what alkaloid is not stated.) The contrast here is between *fine* *Cadiz* *Loxa*, and the *worst* *London*.

The history of the change from the old to the modern *Loxa*, is thus given by Goebel†. "There are, according to Humboldt, immeasurable forests of *Cinchona scrobiculata*. The bark is abundantly collected by the inhabitants, very highly prized, and sold under the name of *Cascarilla fina de Uritusinga*, and shipped at *Payta*. V. Humboldt says further, that in commerce it is only with difficulty that this bark can be distinguished from that of the *Cinchona Condaminea*." This statement, which Goebel gives on Humboldt's authority, but without reference to any work (it might have been information verbally given), is important in reference to the botanical origin of the present "H O bark." I do not know any authentic specimens of the quill‡ bark of *C. scrobiculata*,

by which place all the bark which goes to Europe necessarily passes, assured me that the preference now shown for the smallest quills, is founded on analyses of English Chemists of both barks, and it is probable that the difficulty of drying perfectly the large quills, and their consequently becoming damaged, has contributed to bring them into discredit. The common prejudice is, that in order to lose none of their virtue, the tree should be stripped in the waning of the moon, and on the east side of the tree, and they did not forget to make affirmation before a notary of these circumstances in 1735, as well as of its having been gathered on the mountain of *Cayanuma*, when the last Viceroy of Peru made a provision of bark to carry to Spain on his return. The interest of the collection, which forbids them to remain inactive three-quarters of the year, has caused most of those who gather the bark to give up their prejudice, such as my host at *Cayanuma*, who assured me that all the seasons of the year were equally proper, so long as the weather was dry."

+ The *tabla* of *C. scrobiculata* contains a similar quantity of quinidine, but more cinchonine.

‡ Hayne thus describes the bark of *C. Condaminea* gathered by Humboldt and named *Quina de Loxa*, which were found in a collection of Humboldt's, which Kohlrausch received after Humboldt's return from America, as marked in Bonpland's handwriting. "They are pieces of the thickness of half a line to a line easily broken, in part rolled together, and in part rolled in upon themselves, from the one-sixth to one-third of an inch in diameter. The outer surface *wrinkled longitudinally* with a larger or smaller number of distant, scattered, short *cross cracks*, the edges of which are in a small degree *turned outwards*, covered with scattered elevations, having the appearance of *warts*, of an *unequal brown colour*, sometimes falling into a blackish and sometimes into a yellowish tint, covered with a fragmentary epidermis, sometimes stone grey, sometimes ash grey. The *inner surface is particularly evenly stripped, of the colour of rust, cinnamon brown; the fracture similar in colour, mostly even, a little splintery towards the inner surface*, the outer side showing under the thick epidermis a dark brown ring. The taste peculiarly astringent, a little sour, and only a little bitter."—Goebel, i., 36.

M. de la Condamine says (*Acad. Royale des Sciences, 1738*) "The best quinquina, at least the most celebrated, is gathered in the mountain of *Cayamuna*, situated two-and-a-half leagues south of *Loxa*, and it is from thence that *the first which was brought to Europe was derived*. It is not fifteen years since the dealers provided themselves with a certificate before a notary that the quinquina which they brought was from *Cayanuma*. I visited this mountain on the 3d of February last, 1737, and passed the night on the top, at the dwelling of a man who has made this his residence, to be nearer the cinchona trees, as the collection of the bark is his ordinary occupation and his only trade; on the way, on going and returning, I had the leisure to see and to examine many of these trees, and to sketch on the spot a drawing of a branch with leaves, flowers, and fruit, which are met with at the same time at all seasons of the year. I brought back the next day at *Loxa* many flowering branches, which enabled me to finish my drawing, and to colour it after nature, such as I append to this memoir. [This plate is copied in Woodville's *Botany*, iii., 546. It agrees well enough with the specimens of *C. Condaminea*.] They com-

but Goebel gives Haynes' description of the bark of *C. Condaminea*, as collected by Humboldt, which, as he shows, agrees with the *old*, but not with the *modern* Loxa, whilst, on the other hand, the bark of *C. scrobiculata*, of which Haynes gives the account in the same place, sufficiently points out the *present* H O bark. Goebel concludes, therefore, that in *La Condamine's* time, almost all the bark brought to Europe was that of *C. Condaminea*, but that the present Loxa of trade comes from the *C. scrobiculata*. He says further (p. 42) that the new bark being also sold under the old approved name of *C. fina de Uritusinga*, made the change more deceptive. He gives under the head *Cortex China fuscus*, some good directions for distinguishing the barks of these two species.

I cannot find in the collection of Pavon *any* bark resembling the "H O" (crown) "bark" of commerce.

I will now give my reasons for the arrangement of the several species *under Condaminea*.

Var. a. vera.

No. 32. *Quina amarilla fina del Rey, de Loxa.*

This bark in the Museum closely resembles the "finest old Loxa" bark of which I have given the particulars above, as found at the London Docks. It has, what is well called by Dr. Pereira, a *file-like* coat, and in this respect is entirely like the No. 29 *bis.* sample of M. Guibourt's *Q. gris brun* de Loxa. The cracks ramify in every direction. It is No. xx. on the wood, the coat *smoother*, marked "*Q. de Loxa jaune fibreux*," by M. Guibourt, and more of the character which is described as "like that of a cherry-tree." These two characters of coat seem to interchange, as the *colorada* on the wood is *smoother*, the bark separate is *rougher* than the *amarilla*; the black rough coat of the *Uritusinga* as adhering to the wood, is very remarkable.

The description of the red and yellow varieties by *La Condamine* would seem to indicate the *macho* and *hembra* varieties of the same tree. See Weddell's *Histoire*, p. 21. The botanical specimens in Pavon's Herbarium of the *roxa* and *amarilla* are exceedingly similar; they both resemble Bonpland's *Condaminea* so nearly that I can only suppose them varieties.

The *amarilla* and *colorada* are thus referred to in Lambert:—"M. Pavon having had the politeness to show us the drawing of this shrub (the red), the two drawings (of the red and yellow) appeared to us so similar that we found only a slight difference in the colour of the flowers, and were unable to discern on what character their specific difference could be established†". The same may be said of the two kinds of bark. The *amarilla* is on the whole smoother than the *colorada*, the pieces are smaller, none more than half-an-inch in diameter, the substance brown red, deep cracks with markedly everted edges, and seldom forming rings. Some pieces lose the coat, and shew a maroon-

only distinguish three species of quinquina, although some count four, the *white*, the *yellow*, and the *red*. They told me at Loxa that these species differed only by their efficacy: the *white* having almost none, and the *red* being better than the *yellow*; and that, for the rest, the trees of the three species did not differ essentially; but my guest at Cayamuna, who passes his life in this mountain in barking the trees, assured me, and this assurance was confirmed by the testimony of people of the best information, that the *yellow* and the *red* have NO REMARKABLE DIFFERENCE in the *flower*, in the *leaf*, in the *fruit*, nor even in the *bark externally*; that, finally, they cannot distinguish one from the other by the outside, and that it is only on running the knife into the bark that they distinguish the yellow by its less deep colour, and more tender consistence. The red and yellow grow side by side [This is said to be the case with the red and yellow varieties of *C. lancifolia* in New Granada], and the bark is collected indifferently, although the preference is for the red; the difference becomes still less on drying. Both barks are equally brown outside, and it is the mark which passes for the most sure of the goodness of the bark; they also require that it should be rough outside, with cracks (*brisures*), and brittle."

† Of which he gives these characteristics:—"The epidermis thin, but rather thicker than that of the yellow, wrinkled, of a chestnut brown, and covered with silvery flakes and very small lichens; *transversal fissures*, more numerous than the *amarilla*, and very distinct; thickness somewhat less than a line, roundness or rolling complete; fracture clear, with little filaments in the internal parts; thickness the same as the former, internal surface not so fine, and of a greyish-yellow; no perceptible difference from the former [see No. 32] in the other qualities."

coloured, smooth skinned derm; in others, as in the *colorada*, the coat itself is quite smooth, pale, but cracked; some pieces shew warts split down the middle, of brown yellow colour, lighter than the dark grey of the coating generally. (See Hayne's description of Humboldt's *Condaminea*). On the whole it is a bark of medium-sized quills, brown and heavy, not flexible.

No. 31. *Cinchona quina colorada del Rey de Loxa*.—This is Pavon's name in Lambert's list. There are two samples in the Museum.

(a). No. 31.—Called *Cascarilla colorada del Rey, de Loxa*.—I cannot, on most careful examination, distinguish this from *C. Condaminea*, taking the *C. fina de Uritusinga* (so marked *on the wood*) as the standard of the species. It is more red than the *amarilla*. The cracks are deep, with everted edges, not generally forming rings (this is only noticeable on one piece) but ramifying in every direction; they are about one-eighth of an inch apart, and the whole interval filled up with grater-like protuberances; exactly resembling the (No. 29, Ph. Soc.) *Q. gris brun de Loxa* of Guibourt. The internal structure is rigid, hard, fibrous but slightly so, breaks with a few short fibres on the inner edge. The taste is now feebly bitter. The coat in some pieces becomes smooth in places and quite soft to the touch, covered with a pale yellowish epidermis, on which the impression of cross cracks is still visible.

The general colour is *grey brown*, the larger quills are not rolled together, but open; the bark is heavy, and according to Guibourt has no connection with his *quinquina rouge vrai verruqueux*.

(b.) No. 45.—“*Quina colorada del Rey de Loxa*,” marked on this other side of the wrapper, “*cinchona colorada de Huaranda sp. nova inedita, es buena*.”

Guibourt says † this bark agrees with his “*quinquina rouge non verruqueux*,” which is identical with *casca. colorada de Huranda* in Delessert's collection, and which, in Delessert's list, is marked as the name of the species *Cinchona succirubra*, in Pavon's MSS. It is quite like commercial red bark, the coat is like that of *Condaminea*, but easily detached (some pieces are quite deprived of coat) and shewing various *crater-like* elevations and depressions, such as occur on red bark. The substance brown red, brick coloured: the transverse cracks are rather distant.

The *Cinchona succirubra* “red juice” (whatever its botanical origin) is, I think, commercial “red bark.”

The first of these two specimens must be the *red cascarilla* of Laubert, Lambert (p. 64 †) and his *cascarilla del Rey* (p. 77 †).

The second (b) seems equally to have borne the name *C. cascarilla colorada del Rey*, and to have been *commercial red bark*. Were the two then so nearly allied as to be confused together?

No. 20. *Cinchona cascarilla colorada de Jaen de Loxa*.—This is No. xxxiii. on the wood, which has a coat of bark like the *C. fina de Uritusinga*.

The specimen of bark is a grey bark with red substance. Dr. Pereira suggests that it is probably the “*Quinquina de Jaen, on de Loxa ligneux, rougeatre*,” Guibourt iii. 114, and calls it “grey externally, reddish internally: grey red bark, in quills, *file-like*,” characteristic of *C. fina de Uritusinga*.

No. 40. *C. Cascarilla colorada de Loxa*.—(See under No. 68*).

No. 39. [*Cinchona Cascarilla colorada de los Azogues de Loxa*].—In Lambert but not in the collection. It is No. xxx. on the wood, and has a *Condaminea* looking coat.

† “This bark occurs in large and small pieces, the latter were rolled, *the others only half*, both pretty fine; none are found exceeding a line in thickness. Its epidermis is also very fine, *tawny, greyish, and smooth*; external surface *ochrey inclining to red*; its fracture *clear*, with a *few fibres* towards the interior edges, its flavour styptic, and more disagreeable than bitter, with little or none of the aromatic odour peculiar to good quinquinas. This bark presents on the internal surface *almost the appearance of genuine red quinquina*, but externally it resembles the bark of the cherry-tree.”

‡ *Hist. des Drogues*, Amé ed., p. 124.

No. 68.* *Cinchona colorada de Jaen, es buena, sp. nova inedita*.—Pereira, “File-like, reddish crown, straight quills, rigid fibre, Condaminea coat,” &c. Guibourt calls it *Quinquina de Jaen ou de Loxa ligneux, rougeatre*. No. 20 of the barks of the museum, and No. xxxviii. of the wood marked *Cascarilla colorada de Loxa*, the bark *file-like*, as in the *Uritusinga*.

No. 33. *Cinchona Cascarilla chaharquera de Loxa*.—It is a smoother bark than the *C. amarilla del Rey*, *brown*, with warts split down the middle, maroon-coloured derm, where exposed, moderately fibrous, when cut shews a resinous ring, very bitter, some pieces are sliced from the tree in the same manner as grey bark. Like the broken part of the *Condaminea* found at the London Dock (*b*) and (*c*).

No. 46.* *Quina chaharquera de Loxa*.—This is included by Dr. Weddell under his head *C. Condaminea a vera*. It is No. ii. on the wood, the bark adhering to which resembles the other specimens of *Condaminea*, but the cracks run more into rings around the branch. It is marked in the collection “*Cinchona species nova de Loxa inedita vernaculé chaharquera*.” Dr. Lindley says, † “It is remarkable that Ruiz and Pavon do not, in their published works, notice (the *C. Condaminea*) which nevertheless seems to be one of the most common. I presume, however, that it is the sort which Ruiz calls *C. chaharquera*, and which he says is not only one of the most valuable kinds, but to which the tradition attaches among the bark gatherers of Loxa, of having been the identical bark sent by the corregidor, Don Francesco Lopez Cañezares, in 1638, to the viceroy of Peru, the Conde de Chincon.” The bark in the museum corresponds with (*b*) and (*c*) of the parcel found in the London Dock. Dr. Pereira remarks upon them as “moderately small quills, *crown*, with transverse but not very numerous cracks.”

The prevailing hue of this bark is rusty brown. It is one rich in alkaloids, and deserving the character it has obtained.

No. 44. *Cinchona cascarilla amarilla del Rey de Loxa*.—Not in the Museum, probably a duplicate in Lambert.

No. 41. *Cinchona cascarilla amarilla Uritusinga*.—Also in Lambert, but not in the Museum. The wood-bark is No. xxi., it is rougher than a rasp.

I should refer to this head the bark deposited in the Museum, under the name of *C. Condaminea a vera*, which is part of a parcel that came by way of Lima in 1850. Of this I sent a portion to Dr. Weddell, who recognized it as the bark of *C. Condaminea*.

It is difficult to describe this bark, as it varies so much; but its general character is rough, rugged, dense, much thicker on the large branches than most species, the coat sometimes corky, smooth, and covered with a silvery epidermis, sometimes like a rasp or file, and this character is especially to be remarked in the *canutillos* or small quills, which coincide in this character in the *C. Condaminea a vera*, *lucumæfolia*, *lancifolia*, and, perhaps, other varieties. The *pustular warts*, described by Hayne in Humboldt's *Condaminea*, assume in some pieces a very unique appearance. They occur also on some specimens of red bark.

No. 3. *Cinchona cascarilla fina de Loxa*. Guibourt No. ii., *Quinquina de Loxa brun compacte*. This is the *canutillo* or very young bark, cut from the tree in such a manner, that slices of the wood still remain inside the quill. It may very well be the bark of *C. Condaminea*, which it resembles; some of the smallest quills present the appearance of “silver crown,” and consequently of Seeman's *Condaminea*‡.

No. 60*. *Cinchona sp. nova de Jaen en Loxa, es buena corteza* (*Cortezon* means thick bark: Lambert, p. 71.)

This is an ordinary kind of grey bark, but not at all like that of *C. nitida*. It seems a rather fibrous variety of *Condaminea*, and has *Hypochnus rubrocinctus* growing on it.

† Lindley's *Flora Medica*, p. 415.

‡ *Flora Med.*, p. 415.

Var. β Candollii.

No. 4. *Cinchona cascarilla de Quiebro de Cuenca de Loxa.*

This is No. xxv. on the wood; the adhering bark has the appearance of common "crown bark."

The character of the specimen of bark itself is that of a badly rolled, inferior Loxa: it is convoluted, twisted, ragged, torn; fibrous throughout, but the fibre is not rigid; the cracks are feebly impressed, the edges scarcely everted; the peel of the bark is much smoother than the Uritusinga bark; it is flexible, and appears darkened with age.

This, according to M. Guibourt, is the *Quiebro de Loja, amarilla de Loja, Cinchona macrocalyx*, Pavon, of M. Delessert's collection, lettre 1°.

It must, therefore, take its place under *C. Condaminea var. β Candollii*, Weddell, *Histoire*, &c., p. 38.

"Cuenca" is given by Dr. Weddell as the *habitat* of the *var. β Candollii*.

No. 34. "*Cinchona quina negra 2ª. Espece de Loxa*," Lambert omits "1ª Espece."

Probably No. iv. on the wood, which is labelled *C. negra de Azogues*, the bark adhering resembles that of *C. Condaminea*.

A botanical specimen in my possession, given me by the Museum d'Histoire Naturelle de Paris, bears this inscription, apparently in the handwriting of the collector, M. Pavon. N. 578 *C. negra de Azogues, 2ª Esp.* This specimen is marked by Dr. Weddell, "*Cinchona Condaminea var. Candollii*, Weddell; *C. macrocalyx* (D.C.) Perou. Collection de Pavon donnée p. M. Rivero." I conclude, therefore, that the derivation of this bark is clear. The specimen resembles the figure given by Weddell, Pl. iv., *bis A*.

"*Quina negra 1ª Esp. Cinchona de Loxa*."—*Condaminea* looking bark, varying from "rasp like" to smooth "cherry," the colour brown, some split warts.

"*C. negra, 2ª Esp. (Loxa inferieure*," Guibourt). The bark is blackish Loxa, still with the *Condaminea* coat, and everted edged cracks, much lichen, *parmelia melanoleuca*, &c.

Var. γ lucumæfolia.

No. 55. *Quina con hojas de Lucuma, 1ª Espece.* No. 10. *C. con hojas de Lucuma de Loxa.*—The *Acras Lucuma* (from resemblance to which in the leaves this species is named) is figured in *Fl. Peruv.* vol. iii., pl. 239. My specimen of this from the herbarium of Pavon, is marked "Cas. con hojas de *Lucuma 1ª Exp.* No. 561, &c., Loxa." There are two species of bark in the Museum: 1st species (so marked) fine large quills, resembling the specimen in possession of the Pharmaceutical Society, but with a redder substance. Pereira, "white, large quills." 2nd. species, yet more resembling the above, being paler, of brown colour in the substance.

Pereira. "Quills with white corky coat, no transverse cracks." This is No. xxviii. on the wood, the bark adhering to which has fully the silvery epidermis and corky bark characteristic of the species. On the quill of the larger branches, this character is so definite, that after having seen a package of the kind opened, it would be difficult to mistake it for any other, so unique is its character. The corky bark of the Wych-elm is the only one which I have seen at all resembling it, and this has not the silvery, lustrous coat. The canutillo, or very fine quill, however, assumes so exactly the same character as that of *C. Condaminea* (gathered by Seemann), that I am unable to detect any difference; it is that of the "*silver crown*" of Pereira. The produce in alkaloids resembles that of the other varieties of *C. Condaminea*.

That which I have examined, was imported as "crown bark," in 1848.

No. 36. *C. quina con hojas de zambo de Loxa.*—Zambo, in the dictionaries, means a *citron-tree*, or a kind of *quince*. Whatever the variation in the leaves,

the bark appears to me on attentive examination, to be identical as to physical characteristics with that of *C. lucumæfolia* (No. 55).

No. 56*. *Quina hoja de zumbo de Loxa*. Dr. Pereira observes that it is "white, one specimen has an oblique groove on it, as if it were impressed by a twiner, as I have seen frequently in *lancifolia* bark."

No. 22. *Cascarilla crespilla de Latuna de Loxa, vulgo de Latuna*.

This is No. xxii. on the wood, the bark of which is smooth, and wrinkled longitudinally. The first specimen of bark is in white, corky, large quills.

The second specimen, marked *Cinchona de Loxa, Quina crespilla de Latuna*, is in small quills. I have compared this side by side with the bark of *C. lucumæfolia*, and am satisfied of their entire resemblance. I should have supposed them taken off the same tree.

Dr. Weddell speaks† of a remarkable variety of *cinchona lucumæfolia*, brought from the province of Chacapoyas, in Peru, with coriaceous leaves, &c. Possibly this may coincide with the *hojas de zumbo*, or with the *crespilla de Latuna*.

Var. δ lancifolia.

No. 37. "*Quina estoposa‡ de Loxa*."—This is No. xvi on the wood, the bark on which has a coating characteristic of the varieties of *Condaminea*. It is like that of the *Chaharquera*, rough, file-like, running into smooth, with micaceous epidermis and the same warts. The bark, as to its substance, which is reddish-brown, is a fibrous specimen of *lancifolia*-bark, resembling those which are obtained from New Granada. The small quill is like the "Caqueta" bark, the large, orange-red, with a silvery coat. A quantity which, on comparison appears the same as this, was imported, per Lucy, in 1829, viâ the Pacific, and several similar parcels in that and subsequent years.

Lichens on the specimen *Parmelia melanoleuca*, *Usnea barbata*, very familiar on *lancifolia* bark in commerce. Guibourt, in his *Histoire des Drogues*, 4 ed. p. 106, vol. iii., says this is his *Quinquina de Loxa rouge fibreux du Roi d'Espagne*. It appears to me to be identical with M. G.'s No. 30 in the Pharm. Society's collection.

Estoposa signifies "resembling tow," and this no doubt refers to the fibrous character of the inner bark, which characterizes all the varieties of *lancifolia*, whilst the epithet "*tunita*," or coated, is equally descriptive of the outer surface. I conclude that it is the *stupea* (like tow) of the MSS. of Pavon, which is comprehended by Dr. Weddell, under the head *C. Condaminea a vera*.

It seems to me, that the character of the bark should remove it from under the *a* var. to the var. δ *lancifolia*. The fibrous inner bark, whence the name "fibrous Carthagena," is a most constant characteristic of the varieties of *C. lancifolia*. I have (through the bounty of the Museum d'Histoire Naturelle) in my possession specimens of *C. lancifolia*, which were given by Mutis to Humboldt, and in which this peculiarity is so great, that one might fancy that in pressing the finger against the ends of the fibres, it was touching a hard brush. Quite similar is a specimen sent from Bogota in 1850, by Don Jose Manuel Ristolfo, and accompanied by botanical specimens, which I shall again refer to. Among many hundred serons of New Granada *lancifolia*, I have never seen one in which this peculiarity did not stand out in contrast to those of *Condaminea vera*. There is direct evidence as to the botanical origin of this species in the herbarium of Lambert, in the Museum. Amongst these, is one marked "*vulgo cascarilla estoposa*." In the view of Dr. Pereira and myself, it resembles more the *C. lancifolia* of Mutis than the *C. Condaminea* of Humboldt.

† *Histoire*, &c., p. 39.

‡ Printed by mistake "*estopara*" in Lambert.



Comparative size and shape of the leaves of "*Cascarilla estoposa de Loxa*," and *Cinchona lancifolia*.

The dotted line represents the outline of the leaf of the "*Cascarilla estoposa de Loxa*," contained in Lambert's herbarium. A portion of the leaf has been subjected to some injury, as shown in the lower portion of the figure.

The other figure is the outline of the leaf of Mutis's *Cinchona lancifolia*, taken from a specimen given by Mutis to Bonpland, in my possession.

It appears to have puzzled the botanists, as it is classed under *lucumæfolia* on the one hand, and on the other Lambert has marked *C. Coudaminea* H.B., on the paper of the botanical specimen.

There is evidently a slight difference between the *estoposa* and the specimen of *lancifolia* of Mutis in my possession, but the general resemblance is great. It is the same with the bark of which I have recently obtained a good specimen. It came mingled with "ashy crown bark," in serons, from Lima.

The small quills are so entirely covered with various cryptogamous plants, that they present a similar *facies* to that of the bark with which it was imported. The larger quills are more silvery, with a periderm in some cases partially exfoliating, and leaving the light brown surface of the derm covered with transverse furrows, forming a close imitation of the *C. rufinervis*, Weddell. From this bark it is at once distinguished by its "entirely fibrous" character, and this feature, with the silvery, fretted, and mottled surface of the periderm, induce me to think the bark the same as the No. vi. *Lagartijada* of Laubert.† It would, at least, be difficult to find a term more descriptive of the appearance of the larger quills. Some of these attain a length of twenty inches, and a diameter of from half an inch to an inch.

There is yet another variety of "lancifolia bark" which comes from Peru, and of which I have recently obtained good specimens. This is in much larger and coarser pink orange quills, and in flat pieces six to ten inches long and two or three inches wide. The thick coarse character of the bark, with a smooth surface and very micaceous epidermis, in some cases varying to the rough character of *Condaminea* barks on the young quills, make me think it in all probability the *lampigna* of Laubert.‡ There are, moreover, two characteristic

† *B. de Pharm.*, ii., 299.

‡ *CINCHONA LANCEOLATA* (*Flor. Peruv.*)

CASCARILLO BOBO, OR CASCARILLO AMARILLO DE MUNA.

(From the *Quinologia*.)

The *lampigna* (or *Cinchona glabra*) reaches a height of thirty-six feet, and from one root there arise two, three, or four stems, but for the most part only one; all are, one with another, three feet thick, strong and upright. The ramification is sparingly covered with leaves. The branches run upright, some horizontal, and they are strong. The tender branches carry the leaves on their summits, and in that part have four convex sides. They become strong as soon as they have thrown off their leaves. The bark of the stem and of the thick branches is *dark grey*, that of the middling branches has a clear grey colour, a mixture of ash grey and of dark grey, but the bark of the tender branches is *wholly light grey*, and has a smooth surface. On the stem

features of the Calisaya which the bark I am describing possesses, which make it easy to understand how the origin of the calisaya might be supposed to be traced by M. Ruiz to this bark. I allude, in the first place, to the easy exfoliation of the periderm (a characteristic feature of the Lampigna, according to the Quinologia), and the resulting aspect of the flat pieces, which are marked by *conchas*, almost as well pronounced as in many specimens of the true calisaya. The second feature in which this bark approaches the calisaya is found in the multitude of little prickles which insert themselves into the skin, when the bark is handled as it comes from the serons in which it is packed. This feature is not confined to these two barks, but is peculiarly and disagreeably prominent in them.

On the whole, however, I cannot regard these barks as *commercially* anything else but *lancifolia bark*. The botanical controversy between Mutis and the botanists of Peru is well known, and it is evident they had nothing *exactly* resembling the *naranjada* or *C. lancifolia* of Mutis, by their assimilating to it another bark, the *parecida à la naranjada de Mutis*, which has no sort of real connection with the *C. lancifolia*, but only a general resemblance in the coat.

It is in these barks, the *estoposa* and the *lanceolata*, that Ruiz and Pavon probably anticipated Mutis in the discovery, not indeed exactly of *his C. lancifolia*, but of sub-varieties of the same species. §

There is, in the herbarium of Lambert in the British Museum, a specimen marked *Cinchona lanceolata*, from which a plate has been engraved as *cinchona angustifolia*, and an impression of the plate accompanies the specimen. The *C. angustifolia* is given by Dr. Weddell as a synonyme of δ *lancifolia*.

There is a variety of the *C. lancifolia* of Mutis described, I think, by Laubert as the calisaya of Santa Fé, which exceedingly resembles the bark which I suppose to be that of *C. lanceolata*. In the former the periderm is, however, more adherent and the bark itself softer, and more easily pulverized.

These so-called *calisayas* are only and simply *lancifolia bark*, and have no connection with the genuine calisaya, except in the general features I have mentioned.

The *calisaya arrollada*, or *calisaya de Quito*, of Laubert, is (I think from the description) the bark of one of the varieties of *C. scrobiculata*. The var. *Dclondriana* bears still the name of calisaya of Peru. There is some general resemblance to the bark of *C. lanceolata*, as Laubert states.

I learn that a paper was read to the Vienna Academy of Sciences last June, on "König's Chinarine welche von cinchona lancifolia Mutis herkommen soll." I have not yet seen this dissertation, but if the author means that the *C. lancifolia*, and not the *C. Calisaya*, is the origin of *China regia* or calisaya bark, he must be deceived by such appearances as I have alluded to.

There is a characteristic difference in the chemical constituents of the Peruvian and New Granada *lancifolia* barks, for, whilst the latter are rich in cinchonine, the former contains this alkaloid in a very minute proportion.

I will here give a translation of an early account of the New Granada barks published in Europe in 1779†, in the *Histoire de la Société Royale de Médecine*, p. 256, and also that of M. Ristolfo, in 1850.

and on the old branches, on the other hand, it is rough and *exfoliated*, less rough and exfoliated however on the middling-sized branches.

Ruiz says further of the quills that, without the outer coat, they resemble *the fresh and well-preserved quills of Ceylon cinnamon, only that they have a still brighter colour*. This exactly describes the bark in my possession.

§ M. Alibert received from Messrs. Ruiz and Pavon specimens of *orange bark* from Peru, which differed in some of their physical characters from those which M. Zea brought from St. Fé de Bogota. They were marked by a greater or less number of *transverse cracks*, the colour internally russet yellow, externally of a clear obscure, with black, grey, and white spots, and the pieces much rolled upon themselves. (*Traité des Fièvres peruviciuse*, p. 380.) This must, I think, have been the *estoposa*.

† M. Lopez says that the discovery of the *C. tunita*, or *C. lancifolia*, to which the cascarilla naranjada belongs, was made by him in 1776 at Santa Fé. In this he is at issue with Mutis, who claims the first discovery. *Tunita*, or *coated*, is a very descriptive appellation, as is also the *estoposa* of Pavon, and the *naranjada* of Mutis.

"On two Species of *Quinquina* newly discovered in the Environs of *Santu Fé*, Memoir by Messrs. Daubenton, De Jussieu, &c. 1779.

"M. de Galves, minister at the court of Spain, has lately received specimens of two species of bark, recently discovered in the kingdom of Santa Fé. These specimens were accompanied by the barks in powder. This minister charged M. Ortega to send the specimens and boxes to the Society of Medicine, whose advice he asked as to the reception or rejection of this bark. The two specimens are well preserved, but incomplete. We may nevertheless, by the inspection of the characters which they offer, determine pretty well their species.

"The first has the leaves *oval, smooth*, marked by *reddish nerves (nervures)*, and in all things resembling those of the red quinquina which M. la Condamine sent from Peru, and which M. de Jussieu preserves in his herbarium. The same agreement is to be remarked in the fruits. Without having seen the flowers or the fruit we may decide that it is one of the good species, and we are ready to think it is the *true red bark*, become so rare at Loxa."

[The bark, however, they describe as *pale yellow*, which would represent the *naranjada* of Mutis very well, but certainly no *red bark*. Le premier quinquina *d'une couleur jaune pâle comme rosée*, est sensiblement aromatique, mediocrement amer, fortement astringent, &c.]

(The 2nd under *C. cordifolia*.)

Baron Humboldt decided at last *against* the identity of the *Naranjada* of Mutis with the *Quinquina* of Uritusinga (Weddell, *Histoire*, p. 40), and, as it seems to me, with reason.

No bark that I have seen from Peru at all merits the title of *orange bark*, which is exactly descriptive of the bark of Mutis. This now has established a certain reputation in commerce, and proves neither so good as was boasted on the one hand, nor so bad as was represented on the other, in the celebrated controversy between the botanists of Peru and of New Granada.

Var. ε Pitayensis.

No. 61 *Cinchona Amarilla de Yuta*, *sp. nova. ined.* called in Laubert's Memoir † *Cascarilla amarilla de Juta* §, mentioned by Laubert (Lambert, p. 86) as "in considerable repute." Pereira, "Short, hard, white quills." Probably quilled *Pitaya* bark, J. P. & H.

It consists of curled pieces, two to four inches long, by one in diameter, thick, hard, lumpy, with micaceous epidermis, split warts; *the smaller quills* are altogether like the *Pitaya* bark, having cracks with everted edges, rough grater-like feel, running into smooth skinned portions—the derm maroon coloured where exposed.

The *Cascarilla baya* (Lambert, p. 85) is, I think, the browner variety of *Pitaya*, coming from Santa Fé. Both sorts I have seen in commerce.

† M. La Condamine thus describes the tree of Loxa:—"The cinchona tree is never found in the plains. It grows upright, and is distinguished at a distance from the neighbouring trees by which it is surrounded, for the cinchona trees are not found assembled in tufts, but scattered and isolated amongst trees of other species [the contrary is said of the New Granada *C. lancifolia*.] They become *very large* when they are allowed to attain their growth; there are some larger than the body of a man, the medium ones have eight or nine inches diameter, but it is rare to find *now* (1737) of this size on the mountain, which has furnished the best quinquina; the trees from whence the first barks were procured, which were *very large*, are all dead now, having been entirely barked, which makes the old trunks die to a certainty."

‡ Lambert, *Ill.*, p. 86.

§ Spelt in one place *Yuta*.

In M. Delessert's collection is found a bark called *cinchona amarilla de Jutay de Chito*, ascribed to the *cinchona lutea* of Pavon, which, according to the botanical specimens of Pavon (and to the classification of the *Quinologia* and of Lambert, &c.) is a variety of *C. Condaminea*, or perhaps more strictly of the *lanceolata*.

The leaves of the *C. lutea* are narrower than those of the *C. lanceolata* of Mutis. The var. *Pitayensis*, according to Dr. Weddell, is *foliis lanceolatis utrinque acutissimis*.

Before leaving the interesting species of which so many varieties have passed under our review, I must add, in conclusion, a few remarks, which fuller investigation of the subject require.

First, under my subdivision *yellow*, or *amarilla*, I have obtained a good specimen of the *Quina amarilla fina del Rey*. This was part of a large importation recently arrived from Payta (the port of Loxa) and was pointed out to me as particularly fine bark. It has been compared by Dr. Pereira and myself with the sample of the above bark in the Museum, and found to coincide with this old and highly valued species. The quills are longer, more smooth, and of a much lighter colour than those of the *Uritusinga*, and coincide in every particular with the description given by Laubert§ of the *cascarilla amarilla*, *cascarilla de Loxa*, or *cinchona legitima* of Ruiz. It appears that this species was examined by Tafalla, and a drawing made carefully under his inspection, which was to have appeared in a fourth volume of the *Flora Peruviana*. Ruiz, in the *Quinologia*, considers it a simple variety of the *Condaminea*. "The colour of the internal surface, when recently stripped from the tree, is of a greenish white, which soon changes to a feeble yellow, and augments in intensity until it is entirely dry." In this property it agrees with the *colorada*, which, "at the time it is peeled from the tree, takes on the inner surface the colour of saffron, but rather livid, whilst in its becoming dry its colour deepens and approaches more or less that of Ceylon cinnamon." This depends, no doubt, on the effect of oxygen upon the peculiar modification of colouring matter which pervades the plant; and in the bark under consideration the substance, when recently exposed to view, is of a pale yellow, or almost white, colour, as is well remarked by M. Guibourt when describing the *Quinquina jaune de la Condamine*,† which I take to be the same bark.

M. Guibourt says of this *quinquina* that it is almost the only sort which is now found in French commerce as *Loxa*. In our market it forms one of the finest and most esteemed kinds, but it is looked upon as verging rather more upon the "rusty crown" than the "silver crown" bark. It comes, I understand, not unfrequently, but I have not yet been able to examine it in reference to the alkaloids contained.

The *amarilla Uritusinga* has (so far as I can learn) almost disappeared from commerce; but the Pharmaceutical Society possesses an excellent specimen in the collection of Dr. Pereira. This (as was the case with the parcel I examined) has been tied up in a bundle by means of bass—a practice which the *cascarilleros* still resort to when they meet with any bark they esteem peculiarly good. It is the *Quina selectissima* of Delessert. I see also, in referring to the 4me ed. of M. Guibourt's *Histoire*‡, that M. G. describes this bark as *Quinquina de Lima tres rugueux imitant le calisaya*.

The *grey brown* should, perhaps, rather be the *rusty brown* variety. This (which is, as I conclude, the *knotty* of M. Jussieu), the *chaharquera* of Pavon, proves, on careful examination by Dr. Pereira and myself, to be the *rusty crown* bark of commerce, and also *certainly* the *huamalies* or *rusty bark* of Bergen. This identification, which was suggested by Dr. Pereira on inspecting the samples of Pavon, was entirely confirmed by reference to the specimens of Von Bergen's

§ *Bulletin de Pharmacie*, ii., p. 292, et sequent.

† *H. D.*, 4me edit., p. 106.

‡ *Idem*, p. 112.

huamalies in the Pharmaceutical Society's collection. I had previously noticed the strong analogy, chemically and physically, which exists between this kind of bark and others which I refer to varieties of *Condaminea*. The origin of this bark has been referred to the *C. purpurea* of Ruiz and Pavon; but there are excellent specimens of this bark in the collection of Pavon, which bear no sort of analogy to the huamalies of Bergen, though they coincide with those of *C. pubescens*, var. 7, *purpurea* of Weddell.

The explanation of this disagreement is, perhaps, to be found in the fact that the huamalies was sent over as a mixed bark, "all sorts mixed together, rusty." It could not then be ascertained as the produce of any one tree. Our identification is with specimens of Von Bergen, and with the plate and description of Goebel. This huamalies bark is fully described in Pereira's *Elements of Materia Medica*. Another bark of recent introduction, called here *Carabaya* bark, frequently contains pieces of what is called in Germany *huamalies*. The characteristics of the *huamalies bark of Bergen* should rather lead to its being classed with the red barks of commerce. The *Carabaya* bark is the produce of *C. ovata*, according to Dr. Weddell, who assured me positively of this whilst examining the specimens. The origin is also given in his *Histoire*, &c.

The *cascarilla fina de Loxa* has also been represented in recent importations. Dr. Pereira and I found thirteen chests, out of a sale of 613 packages from Payta and Lima, to be of this character. The *silver crown* and *leopard crown* varieties formed a considerable proportion of some chests, giving thus a connection with the *Condaminea* of Humboldt; for a botanical specimen brought home by Seemann, which agreed with the plate of Humboldt, was accompanied by bark peeled off the same branch, and this proved to be exactly *silver crown bark*. The remainder of the chests were *fine old Loxa*, resembling that in the Museum under the above title, not so heavy nor quite so rough as the *Uritusinga*, but approaching the character of this variety.

The *black* or *quina negra* sorts have been brought in larger quantities. These are evidently inferior barks, the produce of Weddell's β *Candollii*. It is the *Quinquina de Loxa brun compacte* of Guibourt.

The *fibrous orange red* was represented by the *estoposa* bark, of which I found two serons entire, and others mingled with *ashy crown*, in the importation mentioned above.

Commercial red bark was mingled with a portion of the same importation coming from *Payta*, though the usual port for this bark is *Guayaquil*. *Riobamba* and *Cuenca* in the districts bordering on *Guayaquil*, and *Jaen* further south, are mentioned by Laubert as the places where this bark was believed to be first discovered. I can scarcely think that it does not grow also at *Loxa*, which is intermediate between these places, and certainly one of Pavon's specimens of *colorada* (as mentioned above) would pass as such in commerce.

No. 3. *Cinchona scrobiculata* (Weddell).

I do not find the bark of this species in the collection, and should have passed it over if I had not copied Goebel's proposed derivation of the *modern Loxa*, or rather the "HO" crown bark from this tree. Having since inspected the authentic specimens of *scrobiculata* bark brought by Dr. Weddell (now in the Museum at Paris), I am satisfied that this idea is incorrect. I do not remember to have seen in commerce any *quill* bark corresponding to these specimens, and the only examples I have met with are that called *Quinquina de Loxa rouge-marron*, in the collection of M. Guibourt, identified by him (and I think correctly so) with the young bark of this tree brought home by Dr. Weddell, and one I have just discovered in the possession of the Pharmaceutical Society.

I will not dwell, therefore, on this species, nor on the *C. amygdalifolia*, but proceed to

No. 5. *Cinchona nitida* (Weddell.)

Cinchona nitida,† is found under No. *66 of the barks marked "*Cinchona nitida Fl. Peruv. es buena, del Peru.*" The specimen in the collection of Pavon is commercial "grey bark," of fine quality, differing widely from that of any of the varieties of *Condaminea*. It is not quite so *dense*, but is more *resinous*, the outer coat is more even, and does not present the varieties of surface observed in the latter bark. The periderm is, on the whole, adherent; but where it separates from the derm it peels off *in flakes*, and leaves exposed a brown indented surface. The internal surface is yellowish red, approaching to the colour of cinnamon. It is not without reason that the *nitida* is classed by Guibourt among red barks, under No. xi., *Quinquina rouge de Lima*. The colour of the substance of the bark verges (more or less) on the reddish tint, and the difficulty which has been remarked in the isolation of the alkaloids of commercial red bark is found also to exist in this species. M. Guibourt says,‡ that, by an analysis which he was not able to complete, he found this bark very rich in cinchonine and in quinine. My own observations confirm this view of the subject, as I have obtained (notwithstanding the difficulty referred to) about .571 quinine, .142 quinidine crystallized, and 1.4 cinchonine—total, 2.113 per cent. The quinine, however, is in a state which renders it difficult (if not impossible) to crystallize in salts, and this circumstance presents a point of contrast to the species (*C. Condaminea*) with which this tree has been identified by some observers.

M. Guibourt identifies the *Cinchona nitida* of the Museum with his *rouge de Lima*,* as mentioned above, and I fully agree with this, after examination of both specimens. It would appear that the commendation "*es buena*" ("it is good"), bestowed by Pavon, is well deserved, as Guibourt says that he finds this species of *cinchona*, which Ruiz and Pavon have placed in the first rank of usefulness, to be indeed eminently active.

M. Laubert gives a description under the designation No. iii. *La Peruviana*, which very correctly points out this bark, and is, in every particular, applicable, even as to the agreeable taste and pleasant smell (about which features observers seem apt to disagree); but it appears from a note in the *Bull. de Pharm.*, ii., p. 296, that this species was scarcely to be found in commerce. One would conclude the same as to France from M. Guibourt's remarks. It is not the same in England, however, for this sort, the *Quina cana legitima*,§ or "*Genuine grey bark*" of Laubert still keeps its ground in public estimation, and forms the finest samples in the drug market. I found it, in a recent sale, in the following proportion:—Thirty chests *C. nitida*, unmixed; 100 chests mixed with *C. micrantha*; and from thirty to forty chests almost all *micrantha*. All this sold as "grey bark," but the *nitida* was reckoned the finest.

The species called by Ruiz and Pavon *hoja de Oliva*,|| which has been thought to be identical with this, must surely be different, as the leaf of the olive is entirely unlike that of the *C. nitida* in the specimens of Pavon. Moreover, in the

† *C. NITIDA, Fl. Per.*

Vulgo, *Cascarillo fino*, et *Quino fino*.

This cinchona reaches a height of thirty to forty-five feet and above. The trunk is mostly single, but sometimes two or three grow from one root, which separate from each other as they ascend, or have alike a horizontal direction. But if there is only one stem it rises perpendicularly aloft. Its thickness is from one and a half to five and a half feet. It bears many upright branches, which produce very thick boughs. The ramifications do not include many leafy twigs, but some trees are thickly clothed with leaves. The branches are strong as the stem, upright, and full of other small boughs, which have at the end four rather convex sides. The bark of the stem is very fleshy, the outer coat exfoliated, and of a dark grey colour. The bark of the thick boughs has a rough superficies, but is not so knotty as that of the stem, and varies from dark colour to dark grey, ash grey, and light. The bark of the tender branches is very little rough, and has a clear grey colour.

‡ *Histoire Drogues*, iii., p. 121.

§ *B. de Ph.*, ii., 295.

|| I find since this is *Cinchona discolor* (See Weddell's *Histoire*, p. 71)

Quinologia the barks of the two sorts are described separately. The description in the Quinologia, is, however, not unlike that of "grey bark," especially as to the remarkable "gum-resinous sap," which exudes freely in the part which has been sliced by the knife in paring the bark from the tree. Perhaps the *hoja de Oliva* was a simple variety of *C. nitida*.

The specimen of "China Huanueo," in the Pharmaceutical Society's Collection A, No. 2, from M. Von Bergen, agrees (except a few pieces of *micrantha*) with this species, and perhaps his No. 6 and 12 of plate ii. are taken from the same. The rest are either badly executed or from poor specimens.

Omitting No. 6 (Weddell), *C. Australis*, and No. 7, *C. Boliviana*, I arrive at

No. 8. *Cinchona micrantha* (Weddell).

Dr. Lindley says, "I have seen only two certain specimens of this very distinct and well marked species; one in the Lambertian Herbarium, and one in my own, gathered in Peru by Matthews. There is in the former collection a second specimen from Pavon, marked *C. micrantha*, with obovata leaves, and a small compact thyrses of flowers, but it is too imperfect to be determined satisfactorily."†

I have, through the kindness of Dr. Weddell, specimens of both his varieties, *a. rotundifolia* and *β. oblongifolia*, of which the former seems to correspond with the second specimen described by Lindley, and the others mentioned by him with *var. β oblongifolia* (Weddell).

Dr. Lindley says of the leaves, that they are oblong obtuse, or hardly acute, rather membranous, very large, often a span long without the petiole," &c. My specimen of *a rotundifolia* has a leaf more than twelve inches long, without the petiole, and nine inches and a half in width. The size is said to vary according to the place of growth.‡

A sample seron of bark was sent over from Peru, a portion of which I forwarded to Dr. Weddell, who pronounced it to correspond with the *a rotundifolia*, which is the *C. cordifolia* of Rohde, and it is remarkable that the bark has also considerable similarity of appearance with that of *C. cordifolia*, both the tree and the bark, are, however, entirely distinct from this species.

The specimen of *β oblongifolia* has a certain general resemblance to that of *C. scrobiculata var. Delondriana* (Weddell), and with this it has been confused; but no two descriptions of bark can be more distinct than those belonging to these two trees, as specimens brought by Dr. Weddell clearly show.

There seems, however, to be a considerable variety in the products obtained from this species, and it is not very easy to know where to draw the line as to its varieties. In the *Flora Peruviana*, the discovery of the species is ascribed to Tafalla, in the year 1797, at St. Anthony de Playa Grande. In the collection, *Chicoplaya* is named, a place only a few miles distant.

M. Laubert says, § under "No. iv., quinquina resembling the calisaya," "M. Tafalla has sent from Peru some specimens of a new quinquina (a). Under this denomination and under that of *cascarilla provinciana* (b), he collected this bark in the woods of Chicoplaya. The same species also occurs in the mountains of Monzon, which belong to the province of Huamalies, and the discovery of it (c) is to be ascribed to M. Bezares. This bark has a perfect resemblance to the orange-coloured quinquina of Mutis, and Messrs. Zea and Mutis are rather inclined to believe that they may belong to the small species.

It is said that M. Bezares discovered at Monzon this species of calisaya (e); it is also said that he discovered at Monzon a quinquina similar to the calisaya (d), and which is thought to be of the same species with the red quinquina of

† *Flora Medica*, p. 413.

‡ *Folia ovalia*, nonnulla ovali-obovata, integerrima obtusa, obsoleté acuminata, ampla, patentia, plana, ut plurimum quadripalmata, &c., of the *Fl. Peruv.*

§ Lambert *Illus.*, p. 73.

Mutis. It is possible that the discovery of the calisaya, which is ascribed to Bezares, the question may be only on the discovery of this new quinquina resembling the calisaya, which, according to M. Ruiz, is very different from the calisaya, as well as from the orange-coloured quinquina of Mutis. This doubt can be cleared up only by the arrival of the specimens which M. Tafalla is to send.

Afterwards, at p. 89, we find a short notice amongst the quinquinas recently discovered by Tafalla, of the *C. micrantha*, as No. iv. "*Fine cascarilla of Chicoplaya, de flor pequena (with small flowers.)*" (b) "The specimens," it is said, "arrived with those of the former species, but without the bark. This new species is much esteemed where it grows." "It attains the height of twenty-five yards, and grows in the Andes of Peru on the side of Chicoplaya." It is ascribed to *C. micrantha*, *Flor. Peruv.*

We have here, apparently, four sorts of barks assembled under one head, but possessing more or less of different features. Of these we may perhaps identify

First sort, or Sort (a).

C. species nova parecida a la naranjada de Mutis.—This is No. *63 of Pavon's collection. It differs the most from the other specimens: it is in heavy solid quills, with the silvery periderm common to *micrantha* barks, which exfoliates, and discloses a derm purplish, smooth, and cracked in drying. Some of the pieces are fibrous; and this circumstance, together with a certain resemblance in the colour and coat, probably gave rise to the mistaken idea of its resembling the naranjada bark of Mutis.

Second sort, or Sort (b).

No. 17 *Cinchona Provinciana, vulgo de Loxa.* This is No. xxxii. on wood, the bark on which has a silvery appearance. The bark is No. *50, and inscribed *Quina Provinciana species nova de Loxa*, it is marked by Guibourt "Q. gris de Lima ou q.q. Huanuco. It is coarse, that is, inferior, Huanuco bark. It is a heavy bark, in pieces ten inches long, some cut like *C. nitida*, with gum-resinous juice exuding; some with longitudinal wrinkles, some with distant cross cracks, and longitudinal cracks; substance pale brown.

Another specimen is from Jaen.

No. 17. "*Quina provinciana de Jaen de Loxa*," marked by Guibourt, "Q. de Lima." It is, like the other, inferior Huanuco bark.

No. 43. *C. Cascarilla provinciana fina de Jaen de Loxa.*—This is No. xviii on the wood, having a silver-coated bark. The bark not in the collection.

No. 88. *C. quina provinciana de Jaen, Loxa.* M. Guibourt has written on this *Q. Gris de Lima*, 479, 480, *Hist. Dr.*, 3^{nce} ed. Dr. Pereira considers it "Huanuco bark."† It is curled in drying, like Jaen bark, has a green-skinned

† The appellation "*Huanuco bark*" is one liable to some uncertainty. According to Laubert, † "the quinquina to which this name was given was known in Spain for the first time in 1799, as brought by the frigate *La Veloz*, which landed at Santander 180 chests. M. Ruiz, who was deputed to examine this parcel, found in the chests a thick bark, till then unknown to the botanists of Peru, mixed with the barks of *C. nitida* and of *C. lanceolata*, and with those of the species which Tafalla has described under the title, *similar to the Calisaya*. * * The later shipments were less carefully selected, for M. Ruiz found a quantity of barks of still less value than the preceding."

M. Lambert then describes "the thick bark, particularly designated under the name of *Huanuco*," which appears to be the sort which is called by Pavon *parecida a la naranjada de Mutis*, the "*woody variety of grey Lima*," according to Guibourt, and evidently the produce of *C. micrantha*, R. § P.

This derivation is fully confirmed by Poeppig, the well-known naturalist, by whom the region was explored, which supplies the barks shipped from the port of Lima, and which in some countries are named from this place, whilst in others they are called *Huanuco barks*. It is, according to this traveller, § a very mountainous district, broken by numerous ravines; the

† B. de Ph. II., 309.

§ Reise II., 257. (His journey occupied from 1827 to 1832.)

derm, a periderm which easily exfoliates, with longitudinal wrinkles, feeble cross cracks, some warts, and other fungoid excrescences, the quills curl in upon themselves. M. Guibourt in his 4me ed., vol. iii., p. 110, says it is the same as his No. 34 *fine grey Lima*, but a little larger.

It appears to me to be the same as the sort of *pata de gallinazo* which was gathered by Poeppig, in the cinchona woods of Cuchero in 1829, and of which the Pharmaceutical Society possesses a specimen. It perhaps still more exactly resembles the *cascarilla provinciana* from the Cinchona forest of Cuchero, gathered by the same traveller.** I have seen the same sort of bark, under the same name, *Provinciana*, which was received only a few weeks since by Dr. Weddell from Peru. The *pata de gallinazo*, according to Poeppig,†† is from the younger and upper branches of the *Cinchona micrantha*, R. & P., and the *Cascarilla provinciana* is from the larger boughs.

Third sort, or Sort (c).

No. *23. *C. quina parecida a la amarilla de Mutis, descubierta por Tafalla en Chicoplaya, en Peru.*

This is inferior *Huanuco bark*, and corresponds with the species mixed with the bark of *C. nitida* in the sale of 22d April, ult. This again resembles the *cas-carilla provinciana*, both of Pavon and of Poeppig, and also the *pata de gallinazo* of Poeppig.

The botanical specimen in Pavon's herbarium, marked "*Cinchona micrantha sp. nova edita, Flor. Peruv. in Peru,*" agrees entirely, so far as I could judge, with a specimen given me by Dr. Weddell of *β oblongifolia*. The barks differs much, but this is remarked by Poeppig, as regards the varieties which fell under his observations, though of course he did not see those of Bolivia. Poeppig says, respecting the *cas-carilla provinciana Cinchona micrantha* R. and P. of *Cuchero*—"This tree differs from that which grows near Huanuco by a remarkable whitish colour and a greater roughness of the upper surface. It is more thick and woody, the fracture is more fibrous, and the colour clear cinnamon brown. This was probably the sort found both at Chocoplaya and Monzon, places near together, and much nearer to Cuchero than to Huanuco.

Fourth sort, or Sort (d).

The bark discovered by Bezares is said to be similar to the *calisaya*. I do not know any specimens of this apparently "red" kind (Weddell's "Histoire," p. 53), as discovered by him; but it is a curious fact that whilst the *C. micrantha* furnished in Peru the second rate qualities of *grey bark*, in Bolivia the same tree produces second rate varieties of *calisaya*, which pass in commerce as light

Quebrada of Cassapi (of which he gives a plate), furnishing us with a good idea of the whole. Poeppig tells us that the rich cinchona barks are only to be met with on lofty elevations; but there must be exceptions to this rule. In the Part *Geographie et Physique* of Humboldt's travels there is a plate which is called "*Esquisse hypsometrique des Nœuds de Montagnes et des ramifications de la Cordillere des Andes,*" which much elucidates the subject of the bark districts. There I find the next group (*Nœud*) of mountains south of Loxa to be that "of Huanuco and of Pasco," connected of course with the other by the intervening Cordillera. It is on this group, with its branches, that the *Lima* barks are produced, about six degrees south of Loxa and four degrees north of the next group, marked by Humboldt that "of Cuzco." It cannot be supposed that the *Cinchonæ* do not grow on the intermediate ridges; but according to Poeppig the barks procured between Huanuco and Loxa, as grown at a less elevation, are very inferior in quality. He adduces, as an example, the bark grown at Jaen, which has acquired a specially bad reputation, also those of Mayobamba, Chacapoyas and Lamas, belonging to this intervening district. It was at Chicoplaya, north of Huanuco, that the *C. micrantha* was first discovered by Tafalla (See No. 23 *inscription*), and this tree and the *nitida* seems to give the prevailing character to the barks of the Huanuco district, as the *Condaminea* characterize the Loxa group, and the varieties of *scrobiculata* the district of Cuzco.

** These form No. 90 and 91 of the Pharm. Society's collection. The Museum at Paris possesses a similar specimen from Poeppig.

†† Vol. ii., p. 261.

and flimsy sorts of Bolivian bark. I have no doubt of the entire identity of the species in these two cases, as shewn in the specimens before described, and also to be traced in the bark itself, notwithstanding the difference produced by the circumstances under which it is grown.

The influence of soil and climate on the vegetations of the *einchonæ*, and consequently on their production of alkaloids, is a point requiring further investigation. In every species I have yet studied this appears to be *very great*.

The produce of the *inferior grey bark* I have mentioned was in alkaloids as follows:—Quinine .243, quinidine .28, cinchonine 1.25. Total 1.773 per cent.

General Remarks on Grey Barks.—Before leaving the subject of the grey barks I will add a few observations as to the points of distinction between the barks of the *C. nitida* and the *C. micrantha*, a distinction more important in a botanical than in a pharmaceutical point of view, as both may be classed among the more efficacious sorts.

1. The *substance* of grey bark of the first quality being procured from *C. nitida*, is, as observed in the *Quinologia* "*very fleshy*," and thus contrasts with that of *micrantha*, which always partakes more or less of the *woody* character, verging on the *finely fibrous*. This is sufficiently evident in its fracture, but becomes still more apparent under the microscope, when the *nitida* will be seen to approach the No. 30, or *calisaya* structure of Dr. Weddell, and the *micrantha* the No. 32, or *scrobiculata*, structure.

2. The thickness of the bark of the *nitida* in reference to the bough on which it grows is much greater than that of *micrantha*. The fine specimen *C. nitida* in the British Museum, marked No. 36 on the wood, has a diameter of about $3\frac{1}{2}$ inches, and the thickness of the bark is more than two lines, whilst the specimen of *micrantha*, or *provinciana finu*, on a diameter of $2\frac{1}{2}$ inches has not more than the thickness of half a line of bark. In consequence probably of this circumstance the *micrantha* wrinkles longitudinally much more in drying than the *nitida*.

3. The external colour of the derm of the *nitida* varies from maroon colour to that of rust, and that of the periderm (where not covered with lichens) is brown of deeper or lighter shade; the superficial colour of the *micrantha* is as to its prevailing hue glaucous green, and this observation has reference both to the derm and epiderm. The substance of the bark may be considered *red* in the *nitida*, and *rusty yellow* ("d'un jaune orangé clair et grisâtre," Weddell) in the *micrantha*. In some species of this latter bark the tone is much richer and deeper, but still different from that of the *nitida*. In the Bolivian *micrantha* the bark, according to Dr. Weddell, takes, as soon as it is stripped from the tree, a bright blood red colour, and in fact it is not difficult to trace a peculiarly persistent colouring matter in the examination of both the Peruvian and Bolivian kinds of *micrantha*.

4. The appellation *grey* refers in both these species to the striking effect of the overspreading *thallus* of various graphideæ, &c., forming sometimes very pretty groups when carefully examined. It is scarcely needful to say that this circumstance shows nothing as to the kind or quality of the bark, further than a indication that the tree has grown in an open situation exposed to rain and sunshine. §§ Other kinds are occasionally quite as much adorned with this bright clothing, especially the *calisaya* quill, and Goebel has figured together, in plate vii, the quill of grey bark (*C. nitida*) and that of *China regia* (apparently *Calisaya pallida*) as thus resembling each other.

5. The characteristic appearance of the outer coat of the *C. micrantha* (which

§§ QUINOLOGIA, UNDER C. OFFICINALIS.

"These trees grow on the high mountains, where it is cold at night, but sunny and mild by day, and where also other different trees, shrubs, and smaller plants cover the rocks and cliffs. They like a *free air, cold, water, and sunshine*. Shady and close situations are injurious to the full perfection of the bark."

however varies much) is attempted to be given by the same writer under plate vi., fig. 6—8, as Lima or Huanuco barks, and this contrasted with plate vii. above referred to, is the only available representation I can refer to for illustration of this point.

The *resinous character* of the bark of *C. nitida* appears to be described in the *Quinologia* among the characteristics of the finest bark, as follows:—"The gum-resinous sap must be found in abundance inspissated between the outer coat and the bark, and show itself on the fracture of the bark, forming a somewhat dark circle in which (as Bergius says) may be seen some shining points when it is held against the sun." This distinct resinous circle is connected with the constitution of the bark, as indicated by various chemical re-agents, which, so far as I have made experiments, concur in showing that it is rich in all the usual constituents of the *sap* of the cinchonæ, whilst the predominant feature is the abundance of tannin. This must, I conclude, be of importance in a medicinal point of view. The simple decoction of the two barks presents a remarkable point of contrast, for whilst the decoction of the *nitida* is *brown*, becomes speedily troubled, and deposits an abundant sediment on cooling, that of the *micrantha* is *pale yellow*, remains clear for a time, and then gives a small and *flocculent* deposit. The predominant feature of the *micrantha* is to be found in its general woody texture, a feature which is very noticeable in reducing it to powder, whilst the only *hard* portion of the *nitida* is its resinous circle. I cannot but suppose the "fine grey" bark (the *nitida* bark) would act much more powerfully on the human system than the inferior grey (the produce of *C. micrantha*), but no *corresponding* or at least no *adequate* distinction appears to be made in commerce.

No. 9. *C. pubescens* var. β *purpurea* (Weddell).

This species was first found by the authors of the *Flora Peruviana*, at Pati, in the year 1780. It was named by them *Cinchona Purpurea*,† and the collection of Pavon contains two very good specimens under this name.

No. 51*. *C. purpurea* Fl. Per.

No. 62*. *C. purpurea* Fl. Per.

The specimens of bark are in larger and smaller quills, with a rough coarse rigid fibre; the epidermis smooth and warty, and some pieces analogous to

† CINCHONA PURPUREA (*Flor. Peruv.*)
CASCARILLO PAONAZO, CASCARILLO MORADO.
(From the *Quinologia*.)

This tree is commonly as much as twenty-four feet high, and has a single, upright strong stem one and a half feet thick. The ramification is not much covered with leaves, and it opens out on all sides. The branches are strong, and terminate in four convex sides. The back of the stem and of the thick branches is sometimes more, sometimes less dark grey. The upper surface is *neither rough nor uneven*, and the bark of the tender branches is *very light grey*. The marks for its selection are the following:—

1. A smooth, and only occasionally rough upper surface.
2. A light grey epidermis with some dark spots.
3. Internally a cinnamon colour.
4. The bark rolled together in such a manner that one margin rests upon the other. When the quilled bark forms a circle and a half, this is a sign that it has been taken from a tender branch before it was fully ready.
5. A thickness of a pen to that of one inch.
6. A substance of the thickness of some lines, provided that the bark is not from the stem.
7. A lighter weight than the foregoing.
8. A thick substance, but slightly resisting the attempt to break it.
9. An ordinary fracture, with small projecting fibres.
10. A gum-resinous sap, of such sort as corresponds with the consistence of the bark.
11. A feeble smell, but which becomes remarkable and pleasant through boiling, with some aromatic odour, but on the other hand it is not so pleasant to chew.
12. A taste more bitter, sour, and rough, like that of *C. lisuta*, but more pleasant, and resembling the taste of a dried rose which has already lost in great part its aroma.

Cusparia bark on the outside; transverse cracks are almost wanting. The general colour of the epidermis is light grey, but the bark of the trunk is often dark brown, with patches of the whitish epiderm adhering to a surface otherwise exfoliated.

This bark accords entirely with that so named by Dr. Weddell. It occurs not unfrequently in commerce in small quantities; and in 1849 a large importation took place of this, mixed with other kinds. Its commercial value is so low as to discourage collection. I found the thick coarse bark to yield only 0.35 of a very yellow alkaloid, which resembled quinine in solubility in ether, and about 0.60 of cinchonine. It is probable that some samples may be richer than this. The vernacular name *casçarilla boba de hojas moradas*, or "spurious bark with mulberry-leaves," expresses the estimate formed of its value in the country where it grows, and the account of Poeppig, the German naturalist, does not indicate any superior qualities. He says the tree is easily distinguished from all other cinchonas by this circumstance, that its very large and membranaceous leaves are covered on the under side with very prominent violet-coloured veins, which in the early stage of the leaf are so near together, as to give a similar colour to the whole leaf. The bark, when recently gathered, is exceedingly bitter, and might be useful in the preparation of low-priced decoctions, since it could be furnished at an exceedingly low rate. "*It is, at all events, not gathered, and has served only for adulteration, which fraud may nevertheless be discovered by a superficial examination.*" M. Weddell's account is not more encouraging; he says, the name which this bark has received in its native country, proves little in its favour. It is called *carua-carua*, an Indian word, which signifies literally *llama llama*, but figuratively "*very bad*," or "*very inferior*." The llama is indeed looked upon as one of the most inferior animals. In the province of Carabaya, Dr. Weddell adds, he heard it "called also *casçarilla*, or *quina amarilla*, the appellation which Mutis gave, as is well known, to his *C. cordifolia*. *The two barks are indeed extremely alike.*"

The variety *a Pelletierana* is not represented in the collection, although it is stated by a recent collector in Peru that it may be had in abundance, and could be sold very cheap. There is something very peculiar in the chemical constitution of this bark, which merits further investigation. The characterizing yellow colouring matter found in the *pubescens* is *intense* in this variety, and seems to pervade the whole plant, the leaves (if I may judge from a dried specimen in my possession), stalks, and bark; it is, moreover, extremely difficult to isolate the alkaloid from this colouring matter, but when this is effected, it crystallizes freely from ether. The taste of the bark is very nauseous.

The following specimens in the Muscum must also be referred to this head, viz. :—

No. 19. *Cinchona casçarilla crespilla ahumada de Loxa.*

No. 21. *C. casçarilla amarilla de Chito, Provincia de Jaen, Loxa.*

No. 35. [*C. quina amarilla de Quito de Loxa.*]

No. 67*. *C. amarilla de Chito sp. nov. inedit.*

This last specimen has a peculiar feature in suberous convex excrescences, covered with the usual silvery epidermis. It is not to be distinguished, however, from the specimens of *C. purpurea*.

Derivation of "Huamalies" Bark.

The *casçarilla boba* (*fools*, or "worthless bark"), which Poeppig brought back with him to Germany, was submitted to the examination of Reichel, who pronounced it "*the Huamalies bark of trade*," and describes it as "consisting, for the most part, of very young quills, which in part are wholly without the warty elevations, but possessing more abundantly the peculiar longitudinal wrinkles, which distinguish the Huamalies bark from all others. In the younger quills the colour shades off to fallow-grey—in the older the warty elevations are

conspicuous, and the brown lichens are more abundant, which communicate to this commodity a well-known brown colour, when many old barks are lying together in a small compass. Particular pieces are covered with many white lichens, but fully developed lichens are not found on it, with the exception of *Usnea Cinchonarum*. The quills are $1\frac{1}{2}$ to $2\frac{1}{4}$ feet long, $\frac{1}{4}$ to 1 inch in diameter. The taste is sourish and extremely bitter, but this is only perceived after long mastication. The decoction has on cooling a yellow-loam colour, and conducts itself with the usual reagents as a very useful, though a very cheap bark."

This is Reichel's account; but Dr. Edward and Julius Martiny, in their publication, the *Encyklopædia der medicinisch-pharmaceutischen Naturalien und Rohwaarenkunde*, give a different aspect to the matter. They say (in describing the barks of Poeppig) "*casçarilla boba is only used for adulteration, and passes erroneously for a wholly useless bark. With much politeness Professor Poeppig presented us with a specimen of this bark, which comes occasionally, but rarely, in trade, and is found among Loxa barks. It consists of rolled quills of $\frac{1}{2}$ to 1 inch in diameter, the outer coat of which has very little resemblance to that of other cinchonæ. Its epidermis is (for example) almost without cross cracks, smooth, and only crumpled together into long folds by drying. The colour is grey-brown sprinkled with white. Reichel assumes these barks to be the Huamalies barks of trade, and found upon them warty elevations and other tokens of Huamalies bark; but that which we received as casçarilla boba, has not the smallest resemblance to the Huamalies bark, as will sufficiently appear from what has been said.*"

This remark is quite applicable to Poeppig's specimen (it is true a small and poor one) of *casçarilla boba* in the Pharmaceutical Society's collection. It has not the slightest resemblance to Huamalies bark.

It would appear then that Reichel must have been too hasty in identifying the *casçarilla boba* with Huamalies bark, and this is made more clearly evident from several considerations.

First.—The internal evidence of Poeppig's own account militates against this identification. He says nothing of the warty character or other tokens on which Reichel dwells; whereas, it is unlikely he would wholly have omitted noticing the *warty character*, at least, if he had been describing *Huamalies* bark; and then what he *does* mention is, that the bark is almost worthless, and only used for adulteration.

The Huamalies bark, on the contrary, has established its reputation in Europe, and especially in Germany, as a bark of the better description. According to Bergen and Goebel, "it first was known in 1803 in Europe; it was sent in large quantities from 1810 to 1815, and *belongs to the better and more efficacious kinds of bark.*" † "Externally (M. G. says), the Huamalies has a dark rusty-brown colour, which is lighter in some pieces and darker in others, and often shading off towards a reddish colour. The younger barks not unfrequently appear fallow-grey, especially when the epidermis is present, and are sometimes covered with white or entirely dark spots, occasioned by the adhering *thallus*. On the old bark many wart-like elevations are remarked on the surface, *which distinguish this bark from all others.* These warts are very seldom absent, and that only in the case of very young barks. For the most part the surface is covered with many wrinkles, less often with cross-cracks, and then only on old barks. The young barks are commonly *long, wrinkled*, and have fewer or no wart-like elevations, but *always a brownish colour*, which distinguish this bark from all other sorts. On old bark the outer coat is soft and corky, may be scraped off, and then one not unfrequently sees a soft white shining membrane, under which there lies a thicker, tender, inner bark."

These, with other characteristics, are given by Goebel for Huamalies. It certainly appears to me that the bark gathered by Poeppig from the C.

† Goebel, *Ph. W.*, i., p. 62.

pubescens, and described by Reichel, must have been of a very different appearance and quality.

Second.—The chemical analysis is different, so far as it has been carried out.

I have experimented on a sample of *brown warty* Huamalies, agreeing in general appearance with Goebel's Pl. X., fig. 1—5, and found the bark rich in alkaloids, and with no peculiarity such as always marks the two varieties of *C. pubescens*.

In my experiments, as in those mentioned by Goebel, "the thick and flat warty pieces were richer in alkaloid than the thin young quills."

Third.—The comparison of microscopic structure is against the identification.

M. Guibourt has been good enough to send me over examples of the varieties of Huamalies which are so well described by him in the *Hist. Drogues*, IVme edit., vol. iii., p. 145—8, that I need only refer the reader to this volume for particulars. From these I selected the *Huamalies blanc*, which ought the most to resemble the bark of *C. pubescens*. Having taken a slice of it, I compared it, under the microscope, with a section of the bark of *C. pubescens*, var. *purpurea*, from the kind first mentioned in this paper, as found in commerce in 1849, and found it to present a very different appearance.

I conclude, therefore, on the whole, that Reichel must have been misled by some superficial resemblance. The bark of *C. purpurea*, in Pavon's collection, has some few *warts*, and so has the Huamalies; the epidermis is sometimes wrinkled, and so is the Huamalies; but on comparison the apparent coincidence disappears. The warty excrescences are wholly *unlike*, and the barks are altogether markedly distinct.

To what source, then, are we to ascribe this important bark, whether we look on its varieties as *distinct* with M. Guibourt, or as *one* with Goebel?

The question appears difficult to answer, for I believe the Huamalies district is botanically unexplored. I am not aware of any researches in that immediate locality, and Poeppig, who was near it, has, it seems, thrown no light on the subject.

It follows that this must be left as one of the unsolved problems, and yet I cannot but think the *C. Chaharguera* of Pavon is very near to (if not identical with) the *Huamalies* bark, as I mentioned in a previous paper.

This variety of *C. Condaminea* is called by De Candolle β *Chaharguera*. This distinguished author refers to this variety the fruit-bearing branch with outline leaves in the engraving of *C. Condaminea*, in Humboldt's Pl. Eq. The leaves are elliptical, and this and other differences constitute, according to De Candolle, a distinct variety. A specimen (in my possession) gathered by Bonpland has this characteristic, and is markedly distinct from another gathered by Pavon, which last is evidently identical both with the main figure in Humboldt's plate and with Seeman's specimen.

The bark of the *Chaharguera* in the Museum is perhaps yet more evidently a *distinct variety*. It is from comparatively young branches, and, therefore, does not fully show the character of the tree; but the resemblance is (if I do not mistake) so close that it would pass for Huamalies. The warty elevations, where they occur, are similar in appearance to those of this latter bark, and also the peculiar structure of the softer-coated pieces. In these we first see a brown epidermoid coat, beneath this lies a glistening micaceous suberous coat; when this is scraped off a brown rusty cellular coat appears, which immediately envelops the liber. The epiderm and suberous coat are soft, and easily removed by the nail.

These observations were noted down from Pavon's specimens by Dr. P. and myself, and that without any knowledge of Goebel's description of Huamalies; but it seems to me the subject of observation must have been similar in both cases.

It is to be desired that some botanist would explore this district, and settle the question thus pending, which cannot be regarded as unimportant in either a botanical or a commercial point of view.

No. 10. *C. cordifolia*.

I do not find in Pavon's collection any specimen of bark which I can refer to the *a vera* of Weddell.† This is remarkable, as the *C. cordifolia* is said by this author "to have been observed in almost all the localities in which the *Cinchonæ* grow, and is of all others that which travellers most frequently collect." It was first discovered by Mutis at Santa Fé de Bogota, and if we are to judge by the relative quantities imported, must be much more common in those regions than in Peru or Bolivia.‡ The bark of the younger branches bears a great external resemblance to that of *C. pubescens*, but has internally a more pliable and less rigid structure. A transverse section of *cordifolia* bark shows, under the microscope, some few spiculæ or fibres like those of *C. pubescens*, figured by Weddell, Tab. ii., fig. 31, but intermingled with more cellular substance and with finer fibres.

The var. β *rotundifolia* is met with in this collection under

No. 30. *Cascarilla con hojas redondas de Quiebro de Loxa*.

This appears to be the *C. rotundifolia* of Pavon, on which Lambert remarks, "This is a *very distinct species*, being easily distinguished from all its congeners by its narrow cylindrical capsules and by the narrow linear divisions of its stigma." Dr. Lindley also says, "The species is perfectly distinct from all others." (*Flor. Med.*, p. 418.)

Whatever may be the case with this tree in regard to its botanical relations, its bark at least presents all the characteristics of a *very distinct variety*, and one, moreover, which from its frequency in the recent importations, it is important to notice as such. It constitutes that which is now called by the dealers "*ashy crown bark*" in English commerce; and the same is described by M. Guibourt under the head "*Quinquina Loxa cendré (B)*."

The external appearance varies; some of the pieces are almost smooth to the touch, but impressed with minute transverse cracks, and corrugated longitudinally; these often appear as if sprinkled with some white powder, from the adhesion of a crustaceous cryptogamic plant—others of the quills are covered with a kind of pustular eruption of corky warts, which M. G. thinks may be produced by the puncture of an insect. The quills are often abundantly adorned with specimens of *Usnæ*, *Stictæ*, *Parmeliæ*, &c.; and in some sorts a sooty-black incrustation is very prevalent. This kind is, I believe, the "*Dunkle Jaen*" of the Germans; but it does not seem to differ from the former at all more than may be occasioned by growing in a more damp situation. I have found, in the "*ashy crown bark*," of quinine and quinidin 0.418, and of cinchonine 0.914 per cent. The "*Dunkle Jaen*" sort gave me of quinine and quinidine 0.457, of cinchonine 0.300 per cent. This may, therefore, be accounted a tolerably efficacious bark.

The internal fibre is remarkably straight and woody, and of a light brown colour. The taste is astringent and disagreeable.

† There is, however, in the herbarium of Pavon, a specimen which he has designated *Cinchona ovata*, β *inedita*, which Lambert has marked as follows:—" *C. cordifolia*, Mutis, var. secundum Mutisii iconem inedit, ni vehementer fallor," and see Weddell's *Histoire*, p. 61.

‡ The following remarks on the *C. cordifolia* of New Granada, were sent, together with specimens, by Don. J. M. Restrepo, under date "Bogota, 13th December, 1850 :"—

" *C. cordifolia*, No. 1.—The fruit of this species is long, yellow, and abundant, it is found in the forests under a higher temperature than the *lanatifolia*. This tree is more abundant and thicker than the *lanatifolia*.

" *C. cordifolia*, No. 2.—There appears to be some difference between this species and the former. The fruit is smaller and of a black colour. The fibres of the leaves have but little red, rather inclining to green."

The bark of these two varieties differs very slightly in appearance. It is described as very abundant, but varying in its products with the soil on which it grows.

Large quantities of this bark are now sold for pharmaceutical purposes.

No. 12. *Cinchona ovata*.

Dr. Weddell remarks that "no cinchona, unless it be the *C. Condaminea*, is so susceptible of variation with the soil and climate as the *C. ovata*."

This observation holds good with reference to the different kinds represented in Pavon's collection, but it becomes much more forcible when the *var. β rufinervis* of Weddell is included in the list. Indeed, there is no resemblance at all between the barks ranged under this head, so that, however in a botanical sense they may be *one*, in a commercial point of view they must be accounted *many* sorts; which might perhaps be classed as follows:

First sort.—The smooth-skinned or "pale" variety.

a. With light brown substance, comprehending "Pale bark" and "Ash bark."

β. With orange red substance.

Second sort—The spotted variety, or Carabaya bark.

Third sort.—The exfoliating variety, or pseudo-calisaya of Weddell.

Fourth sort.—The corky variety.

Fifth sort.—The mammellated variety.

Sixth sort.—The hard-coated variety.

Seventh sort.—The fibrous variety.

First sort, a.

No. **5, *C. ovata*.—*Flor. Peruv.*

This is something like "ash bark," but whiter than the general average of this sort. I have called this the "smooth skinned,"† or "pale" variety, because the epithet *pale* by itself does not seem to me to convey at all the real character of the bark.

There appears to have been established a prejudice against *white* or *pale* barks, of which the *cascarillo palido*, and the "ash bark," the produce of *C. ovata*, had to partake, and that (as it seems to me) rather unjustly, as this species of cinchona is by no means poor in alkaloids. I have found, even in a mean-looking specimen of "ash bark," the following products:—Quinidin (crystallized) 0.61, cinchonine (crystallized) 0.86.

This was from a specimen very much resembling the one under consideration in the Museum, but the same tree grown in Bolivia affords a much higher result on the average, yet still retaining its predominant *quinidin* character.

The flat which accompanies the quill of this sort, gave me (in one trial) as much as 1.2 of quinidin, and 1.6 of cinchonine.

† Ruiz, in his *Quinologia*, remarks as follows—"Dealers in bark divide the article according to the epidermis, or the external colour of the skin, into seven peculiar and pretended different sorts, even when the barks come from one and the same tree.

"These sorts are called the black, the grey, the dark-coloured, the ash-coloured, the white, the sort party-coloured like the foot of [some bird, *gallinazo*?], and the crisp (*crespilla*). This difference proceeds from the lichens, which grow on the bark. The colour, which for the most part characterizes the cinchona barks, is clear grey, with scarcely any lichens. This colour is remarked on the young trees, on the tender branches, and on that sort of trees and young shrubs on which the lichens are not yet grown. The surface of the bark, which exhibits the seven specified appearances, is rough and horny, and is all received in trade; but, on the contrary, the others, which have none of these colours, are rejected from commerce, although they may be from the same tree, and have the other characteristic marks which this tree should possess."

Ruiz seems to think, however, that there is something to be learned by this mode of discrimination, and says, further, under the head outer coat, among the criteria of good bark—"The outer coat of good barks is, for the most part, rough and uneven; that of the middling sort is less rough; and that of the most inferior is smooth, more or less according to the scale of their diminished worth."

I quote this, not as confirming the remark, but in order to illustrate what I have written above.

No. 16. *Pata de Gallinazo vulgo de Loxa* appears to be the same sort. It approaches "ash bark," but when the finger is passed over it feels rough like a fine sand-paper.

First sort, β.

No. 31.—*C. ovata cascarilla boba pata di Gallereta*. I have mentioned above that the great peculiarity of this sort consists in an orange-red colour of the substance, to which I may add the strikingly yellow-white (though mottled) foliaceous epidermis, which in some pieces becomes wrinkled and has long strings of warts opening one into the other. The bark is in quills one foot long and half an inch in diameter, the bark rolled in upon itself, with a brown derm, and cuts easily. I have never seen this kind in commerce.

Second sort.

The spotted variety, or *Carabaya bark*. This is not represented in Pavon's collection, but I have seen a specimen of it sent over quite recently under the same name (*Pata de Gallinazo*) as the first sort.

Third sort.

The exfoliating variety or pseudo-calisaya of Weddell. This is not found in the collection, but has been fully investigated by Dr. Weddell, and named by him var. β rufinervis. In this variety the *C. ovata* approaches to the *C. Calisaya*.

Fourth sort.

The corky variety. Woods No. 3. *C. quina pata de Gallinazo*. This kind is better represented in the "Collection Delessert," where it is called also *C. suberosa* by Pavon. It is remarkable for the abundance of cork which it produces, so that some pieces almost resemble the produce of the genuine cork-tree, only that it gives way in cross cracks as well as laterally. I have never seen any quantity of this together, but only specimens intermingled with other barks.

Fifth sort.

The mammellated variety. No. 27, *C. cascarilla serrana de Huaranda, Loxa*. "Serrana" means growing in the mountains.

This bark is a kind of Jaen-looking bark, in coarse, twisted, white-brown quills, with a peculiar mammellated appearance, owing to some obscure warts. I have seen it imported singly as well as mixed with other kinds. Dr. Weddell has remarked the tree as a variety of *C. ovata*, of which he has a botanical specimen, and has favoured me with a portion of the bark, which agrees with this of Pavon.

Sixth sort.

The hard-coated variety. This is represented by No. 18 B. in the collection of the Pharmaceutical Society, called by Dr. Julius Martiny *Cortex chinæ pseudo-regius*. It is accounted by Dr. Weddell the produce of *C. ovata*, but has several very distinctive peculiarities. The internal portion of the bark is remarkably finely fibrous, but the outer half, on the contrary, has quite a hard structure, which breaks short, and abounds on the exterior with oval cavities filled with fungoid matter. When a large piece (the pieces are generally half quilled) is cut through with a fine saw, the outer portion is seen hard, and as if polished by section, whilst the inner part displays its peculiar fibrous structure. The younger branches are covered with a smooth, greenish-black epidermis, unlike any other sort that I have seen.

Seventh sort.

The fibrous variety. This is not found in the collection, it is M. Guibourt's *Q. blanc fibreux de Jaen*, and is the sort from which Mazzini drew his Cinchovatine. This appears to me to be the same alkaloid which in these papers I call *quinidin*—at least I am unable to detect any difference between them. I have examined this peculiar sort of *C. ovata*, and obtained from it quinidine in well-defined crystals.

No. 14. *Cinchona glandulifera*.

This is the *casçarilla negrilla* of Poeppig, which this author considers the finest sort found in the neighbourhood of Cuchero. In comparing a specimen gathered by this naturalist, and now in the collection of the Pharmaceutical Society, together with other specimens collected by M. Goudot, and now in the Museum at Paris, with the "H O" bark of British commerce described in a previous number, I have come to the conclusion that they are identical. The "prevalent black colour of the epidermis;" "the shining and almost resinous fracture;" "the colour of a ripe orange on the inner surface, shading off to a fiery brown;" All these characteristics mentioned by Poeppig agree with the new "crown" or "H O" bark mentioned above. Moreover, the arrangement of the cross rings and the general appearance of the outer coat in a piece of *C. negrilla*, in my possession, collected by Goudot, are exactly similar to pieces in the "crown" bark under notice. The taste, described by Weddell as "tolerably bitter, very styptic, and a little aromatic," also, I think, coincides.

Poeppig gives another variety, which he calls *casçarilla provinciana negrilla*, as the product of the same tree, grown under different circumstances. The chief difference seems to be that this last is a more woody sort and of paler colour. This also is the case with some pieces in the new "crown" bark.

If the *casçarilla negrilla* is represented at all in Pavon's collection, it is, I think, under

No. 24. *C. quina crespilla parecida à la buena de Loxa*.

Of this Laubert remarks that "it is not known whether it is a species or a variety." The cross cracks form rings with remarkably everted edges, and in this particular respect it agrees with the *negrilla*, but it seems more hard and woody than is usual with the latter bark. It may be the *provinciana* variety; at all events I am unable to assign it to any other tree

No. 16. *C. Humboldtiana*.

Of this species (the *C. villosa* of Lambert) there are three botanical specimens, classed thus by Lambert, *a. C. villosa inedita*; *β. γ. C. sp. nova de Jaen de Loxa, sou dos exemplares del numero 1°*. It is on the ground of this inscription that I bring No. 39 under this head.

No. 25. *C. quina con hojas un poco vellosas de los Azogues de Loxa* (*Azogues*, a hamlet so called near Loxa). *Foliis subvillosis*, according to Tafalla. This is called by M. Guibourt *Q. de Loxa jaune fibreuse*. It is a peculiar Loxa bark covered with lichens, giving it a leprous character; most resembling the *Quina negra* in its general appearance.

No. 39. *C. sp. nova de Jaen de Loxa, es buena corteza*. Is a fibrous Loxa bark, moderately heavy, somewhat like *lancifolia*.

No. 27 on the wood is the same bark, and the coating seems to be that of an inferior Loxa bark.

Dr. Weddell says of *C. Humboldtiana* "crescit ad urbem Jaen in Peruvia septentrionali."

No. 18. *C. Mutisii*.

Var. *a. microphylla, C. quercifolia*. Pavon in Herb. Lambert.

No. 13. *C. con hojas de roble de Loxa* (oak-leaved). *Foliis ovatis rugosis, minoribus*. Tafalla, var. *β crispa*.

No. 9. *C. con hojas rugosas de Loxa*. *Foliis ovatis, integerrimis rugosis*. Tafalla.

These two specimens present us with the bark of the two varieties (the smaller and the larger leaved) of the species mentioned above. They are very much alike, and distinguished from all other cinchonæ by their *exceedingly fibrous* character, in which respect they surpass even the *C. amygdalifolia* of Weddell. The bark has a grey coating, and is often smooth for long distances. It separates laterally with great ease into long filaments.

The No. 9 is called in the Collection Delessert, from the shape of the leaves,

Cinchona parabolica, and the botanical specimen of this (so named by Pavon) in Mr. Webb's collection, at Paris, shows it to be the *var. β crispa* of this species.

This very remarkable bark is the *Quinquina payama de Loxa*, described by M. Guibourt in his *Histoire de Drogues*. This M. G. asserts, and I can confirm it from inspection both of his specimens and those of Pavon.

No. 20. *Cinchona discolor*.

This, according to Weddell, is the source of the bark called *hoja de Oliva*, for remarks on which see under the head *C. nitida*.

Barks of uncertain origin.

The preceding are all the specimens in Pavon's collection which I can refer with any certainty to the genus *cinchona*, or at least to any definite species. The following I also suppose to belong to this genus, but have no satisfactory account to give of them.

No. 2. *C. cascarilla crespilla de Jaen de Loxa*. *Cinchona umbellulifera*, Pav. MSS.

No. 6. *C. cascarilla Puchon di Loxa*.

No. 11. *Quina crespilla de Loxa*.

No. 24. *C. quina crespilla parecida a la buena de Loxa*. Synonym "Quina carrasquena," according to Lindley, from MSS. of Ruiz.

No. 29. *C. cascarilla con hojas de Palton de Loxa*.

No. *31. *C. crespilla mala de Macos*.

I am inclined to think one or more of the above crespilla barks may (as I have before hinted) range under the head of *C. glandulifera*, but the authentic examples of *C. agrifolia* are too poor and vary too much among themselves to permit the full decision of the question.

GENERAL OBSERVATIONS.

In order to render more easy of reference some of the facts contained in the preceding portion of this paper, I have prepared the following tables, which will be found to comprehend in a brief space all the remarks I have been able to make on the collection in the British Museum, together with some notice of the specimens of bark collected by Pavon, and now in the possession of M. Delessert at Paris. It will be found that some of the numbers which I have previously given, do not correspond to those in the present table; the explanation of this circumstance (which I hope will not cause much trouble in reference) is to be found in the state in which the specimens were when first examined by Dr. Pereira and myself, since they were then entirely without number or arrangement.† In the course of these investigations, I have been obligingly furnished with the sight of the original lists sent by Pavon. These were three in number, and will be found condensed into one table, in which I have also included a notice of the missing specimens. The numbers have now been attached according to these lists, to the barks in the Museum, so that it will be very easy in future to refer to each specimen. In addition to the contents of these three lists, there are eight packets, of which no account can be given, except that they appear to have been obtained from the same quarter. These are distinguished by numbers with double asterisks. The lists have been placed in the order of the time they were prepared by Pavon; but in the arrangement of the species in each list, the numerical order of the second list has been followed, firstly, because that list is the most complete; secondly, because it is the one given by Mr. Lambert in his *Illustration of the Genus Cinchona*, p. 17, 1821; and lastly, because it corresponds to the numbers given by M. Guibourt (in the 4me edit. of his *Drogues Simples*) and which he must have found attached to the barks.

The observations of Laubert from Tafalla (included in the tables) appear to me of very considerable interest, and these it will be observed I have extracted from a table given at the end of the memoir of M. Laubert, in the *Bulletin de Pharmacie*.

† The numbers inscribed by Pavon on the specimens of wood were fortunately incapable of being lost.

TABULAR ARRANGEMENT OF PAVON'S COLLECTION OF PERUVIAN BARKS CONTAINED IN THE BRITISH MUSEUM.

Vernacular Name according to Pavon.	Description by other Writers.	Botanical Name and Specimens.	English Commerce.	Guibourt's Histoire des Drogues.	Remarks.
14 C. vulgo Azaharito de Loxa.	.....	<p>Cascarilla stenocarpa. Pavon's herbarium in the Museum contains one specimen marked <i>Cinchona stenocarpa</i> by Lambert, and by Pavon <i>C. sp. nov. ex Jaen in montibus Loza, Quito</i></p>	Not met with	<p>{ Resembles <i>cos-tus amer</i>, H.D. III., 170. }</p>	<p>{ The substance hard white, and like that of a Cascarilla. Like Malambo bark. }</p>
1 C. cascarilla erespilla de Jaen de Loxa	<p>{ Cascarilla fina provinciana, y cascarilla erespilla de Jaen (Collection Delessert, Lettre Q). }</p> <p>{ "Has some resemblance to See-man's specimen, but is not quite so bright."—P. "Omnium prætans." De Oand, Prod. IV., 352 }</p>	<p>Cinchona umbellulifera (Pav. MSS.)</p> <p>{ Cinchona Condaminea, <i>æ vera</i> (Weddell)..... } The Uritusinga variety</p> <p>{ Cinchona macrocalyx (Pav.) β Candolli (Weddell). One specimen in the Museum differs much from the specimen of β Candolli, marked <i>Q. negra de Azogues</i>, in J. E. H.'s collection</p>	<p>Inferior grey bark</p> <p>{ Fine Loxa, containing crown "Silver crown" and "Leopard crown" bark }</p> <p>Inferior Loxa</p>	<p>{ Quinquina de Lima gris brun</p> <p>{ Q. de Loxajaune } breux de commerce actuel. H.D. III., 106 }</p>	<p>{ Crisp, woody, hard, blackish quills, rather like case, negrilla. }</p> <p>{ Thirteen chests of this out of 613 packages from Payta and Lima in a recent sale. }</p>
25 C. cascarilla de Quebro de Cuenea de Loxa (<i>Quebro</i> , a ravine) .....	.....	<p>Lasionema roseum (Weddell)</p>	Not met with.	.....	<p>{ The cross cracks are feebly impressed; the bark generally smooth and flexible. }</p>
24 C. cascarilla Tarontaron de Loxa	<p>{ C. rosea (R. & P.) cascarillo pardo (Ruiz, <i>Quinologia</i>, 77) <i>Asmonch</i>, in Peru</p> <p>{ "Cinchona quina Puchon de Loxa," and "C. case. Puchon de Jaen" on the envelope</p>	<p>Some resemblance to <i>C. Australis</i> (Weddell).....</p>	.....	.....	Missing.
19 C. cascarilla Puchon de Loxa	<p>See No. 38</p>	<p>Cascarilla magnifolia (Weddell)</p>	<p>{ Very rare in this form</p>	<p>H. D., III., 163</p>	<p>{ "A pale, gouty-jointed, white-quilled bark," Pereira. }</p> <p>{ Small quill, with greenish white parchment epidermis. }</p>
C. cascarilla Flor. de Azahar .....	.....	<p>Lasionema roseum (Weddell)</p>	Unknown.....	<p>{ George d'Asnonnich, H.D., III., 171. }</p>	Rusty brown chips.
C. con hojas rugosas de Loxa	<p>{ C. Con hojas rugosas. Fol. ovatis integrerinis, rugosis (Laubert á Tafalla)</p>	<p>Cascarilla erespilla con hojas rugosas de Loja. Cinchona parabolica (J. Collection Delessert) C. Mutisii β crispata (Weddell) ...</p>	Ditto	<p>{ Quinquina payana de Loxa. H.D., III., 159 }</p>	<p>{ Extremely fibrous bark. Resembles No. 15. }</p>
26 C. con hojas do Lucuma de Loxa, 1 ^a especie.....	<p>{ Foliis Lucumæ, capsulis ovatis. (Laubert á Tafalla)</p> <p>{ Fol. subrotundo-ovatis, marginibus convexis, floribus intus diluto rubris (Laubert á Tafalla)</p>	<p>Cinchona Condaminea, γ lucumæ-folia</p>	<p>{ A kind of crown bark</p>	<p>{ Quinquina de Loxa gris compacte. H. D., III., 101. }</p>	<p>{ Fine large quills, red substance. }</p>
8 C. Quina erespilla de Loxa .....	.....	<p>Bark missing in the collection</p>	Grey Loxa .....	.....	.....

13	C. con hojas de Koble do Loxa	{ Fol. ovatis, rugosis, minoribus (Lau- bert á Tafalla) C. quercifolia (Pavou, MSS.)	{ Ditto	{ <i>Vide Q. payama</i> do Loxa.....	{ Resembles C. amygdalifolia. (Compare No. 9.)
14	C. laccifera del Peru, parecida a la roxa de Mutis ..	{ Discovered by Tafalla—vulgo Socchi macha,	{ Cameo in a small quantity in 1851	{ Ecorce de Paraguan. H. D., III., p. 167 ...	{ A madder pink bark sent to Europe first in 1798. It differs from the roxa of Mutis.
15	C. azahar macho de Loxa ..	{ Tho bark is labelled "Quina azahar macha,"	{ Ditto	{ H. D. III., 163. (Foot note.) ...	{ Colour black-purple, otherwise like the <i>hembra</i> .
16	C. pata de Gallinazo, vulgo do Loxa. 2º especie de Loxa	{ "Foliis ovatis, acuminatis, capsulis sanguineis (Laubert á Tafalla)	{ Inferior fibrous pale bark	{ Quinquina blanc de Loxa. H. D. III., 155	{ "Approaches to <i>ash bark</i> , but when the finger is passed over, feels rough like a fine sand-paper." Fercira. The substance of the bark brown, <i>Sticta aurata</i> and <i>Parmelia melanoleuca</i> adherent.
17	C. Provinciana, vulgo de Loxa (See *33, *18)	{ "The C. Provinciana of Cucherodiffers from that of Huanuco by its strikingly whiter colour and rougher surface. It is thicker and more woody, the fracture more fibrous, the colour cinnamon brown."—Poeppig	{ Coarse Huanuco bark	{ Q. Huanuco ou Quinquina, gris de Lima. H. D. III., 109	{ Greenish, wrinkled Huanuco bark.
18	C. Azahar, hembra, vulgo de Jaen de Loxa	{ The C. oblongifolia of <i>Laubert</i> according to Weddell, Histoire, &c., p. 83.	{ Unknown	{ H. D., III., 166	{ Resembles <i>Cascarilla acutifolia</i> .
19	C. cascarilla crespilla ahumada de Loxa	{ Fol. obovatis, nervosis, rugosis (Lau- bert á Tafalla)	{ A quantity sold to paydook charges in 1848	{ Gris pale ancien	{ <i>Ahumada</i> (smoky) bark with coarse fibre and greenish epidermis.
20	C. cascarilla colorada de Jaen de Loxa	{ R. Cascarilla colorada de Loja, de la Provincia de Jaen (Collection Delessert)	{ Grey bark with red substance	{ Quinquina de Jaen ou de Loxa, ligneuse, rougeâtre. H. D., III., p. 114	{ Straight quills, grey-red bark, file-like coat, rigid fibre.
21	C. cascarilla amarilla de Chito, Provincia de Jaen, Loxa (See **7)	{ The "amarilla" of M. Guibourt's "Pettit Collection." H. D. III., 107	{ "Cusco"	{ Purpurea, or ovata. H. D., III., 156	{ Clearly identical with the samples of C. Purpura in this collection.
22	C. cascarilla crespilla de Latuna de Loxa	{ White, corky, large quills. (Pereira.)	{ Would be called "crown"	{	{ Appears like a good bark.
23	C. quina parecida a la Quina amarilla de Mutis, descubierta por Tafalla en Chicolpaya en Peru	{ "Grosse ecorce designé particulièrement sous le nom de <i>Huanuco</i> ." (Laubert)	{ Woody Huanuco bark	{ Quinquina de Lima gris, variété ligneuse. H. D., III., 111	{ The original <i>Huanuco</i> bark.

Vernacular Name according to Pavon.	Description by other Writers.	Botanical Name and Specimens.	English Commerce.	Guibourt's Histoire des Drogues.	Remarks.
C. quina erespilla parecida à la buena de Loxa	{Synonym "Quina earrasquena" (Ruiz, according to Lindley, from MSS. of Ruiz)	{ "On ignore si c'est une espece ou une variété," Laubert à Tafalla... } { Humboldtiana, Weddell. C. villosa. Three specimens } { "C. villosa inedita (Pavon). β γ } { "C. sp. nova de Jacn de Loxa, son dos exemplares del numero 1º" } Casearilla?	{ Fibrous crown bark	{ Quinquina de Loxa jaune fibreux. H.D., III., 107. } { Q. de Loxa, jaune fibreux. H.D., III., 107. }	{The cross cracks form rings with remarkably everted edges; but some of the quills are quite smooth and silvery. Covered with lichens, giving it a leprous character.—Pereira. Heavy bark, with coarse reddish fibre and epidermis like the oblongifolia. "Coarse, white-brown quills,"—Pereira. With a mammelated coat. Resembles entirely the bark described by me in the Pharmaceutical Journal. "Palton, pyri indica genus,"—Lambert. "A very distinct species."—Lambert. A red substance bark with white foliaceous epidermis. Larger of No. **5 "resembles Howard's specimen" (Pereira) Appears to be a variety of Condaminea.
C. quina con hojas un poco vellosas de los Azogues de Loxa	{ "White large quills" (Pereira) Foliis sub-penduriformibus, capsulis sub-globosis. (Laubert à Tafalla) Foliis lanceolatis, glandulosis, subtus luteo-virescentibus capsulis ovatis. (Laubert à Tafalla) Cinchona rotundifolia (Pavon, MSS. Lambert, Ill., p. 5).	{ C. rubicunda (Tafalla), variety of } { Cine. ovata	Unknown .....	.....	.....
C. con hojas de Lueuna. 2º especie	{ "White large quills" (Pereira) Foliis sub-penduriformibus, capsulis sub-globosis. (Laubert à Tafalla) Foliis lanceolatis, glandulosis, subtus luteo-virescentibus capsulis ovatis. (Laubert à Tafalla) Cinchona rotundifolia (Pavon, MSS. Lambert, Ill., p. 5).	{ C. rubicunda (Tafalla), variety of } { Cine. ovata	Sold as a kind of Jaen bark..... Called "Crown bark" .....	.....	.....
C. cascarrilla con hojas de Palton do Loxa	{ "White large quills" (Pereira) Foliis sub-penduriformibus, capsulis sub-globosis. (Laubert à Tafalla) Foliis lanceolatis, glandulosis, subtus luteo-virescentibus capsulis ovatis. (Laubert à Tafalla) Cinchona rotundifolia (Pavon, MSS. Lambert, Ill., p. 5).	[The bark missing in the collection] C. cordifolia b rotundifolia, Weddell. One specimen in the herbarium marked <i>Cinchona rotundifolia inedita</i> (also, two specimens of C. Condaminea	Ashy crown bark	{ Quinquina Loxa eendré (B.)	"A very distinct species."—Lambert.
C. ovata, o cascarrilla hoba } pata de Gallareta del Peru }	{ "White large quills" (Pereira) Foliis sub-penduriformibus, capsulis sub-globosis. (Laubert à Tafalla) Foliis lanceolatis, glandulosis, subtus luteo-virescentibus capsulis ovatis. (Laubert à Tafalla) Cinchona rotundifolia (Pavon, MSS. Lambert, Ill., p. 5).	Cinehona ovata, Weddell	{ This particular sort does not come in commerce..... } Not common .....	.....	A red substance bark with white foliaceous epidermis. Larger of No. **5 "resembles Howard's specimen" (Pereira) Appears to be a variety of Condaminea.
C. globosa, uñas de Gato vel aculeata de Guayaquil.....	{ <i>Unas de Gato</i> (cat's claws) "stipulis revolutis floribus capitatis, conglomeratis," (Laubert à Tafalla)	{ Cine. globifera, Pavon. Nancela? } { Cinehona, De Cand..... }	Has probably ceased to come	.....	.....
C. quina colorada del Rey, de Loxa.....	{ <i>C. colorada</i> , fol. inequaliter ovatis, acuminatis, nervosis, glandulosis; floribus interne bicoloribus, capsulis virescentibus. (Laubert à Tafalla)	{ C. colorata, Pavon. Fol. ovatis utrinque acutis, floribus majoribus, Lambert. Two specimens in Lambert's collection, one with leaves resembling Condaminea & vera, the other more ovata (Laubert à Tafalla)	Not common .....	.....	.....

<p>C. purpurea Fl. Peruv.</p> <p>C. quina amarilla fina del Rey, de Loxa</p>	<p>In general without cracks." (Pereira)</p> <p><i>C. amarilla</i>. Fol. obovatis, acuminatis, floribus internis inaequalibus (Laubert à Tafalla)</p> <p>"C. species nova, inedita, vernacule <i>chaharguera</i>."</p> <p><i>C. chaharguera</i> nom indien. Fol. glandulosus laucolatis sub-rotundis, capsulis ovalibus. (Laubert à Tafalla)</p> <p>Fol. floralibus ovatis; floribus interneris purpureis</p> <p>"The outer surface of the derm is purple-brown, showing like reddish birch bark" (Pereira)</p> <p>Facies C. Condaminæ, at diversissima (Laubert)</p> <p>Compare Nos. 17, 23, *50, and *18</p> <p>"La Peruviana" of Laubert. B. de Ph., II., 295</p>	<p>and another, <i>Cinchona purpurea</i> affinis sp. nov. inedita Fl. Peruv., which looks like the var. <i>Peltetiana</i></p> <p><i>C. lutea</i> Pavon., Fol. ovatis utrinque acutis, floribus majoribus.—(Lambert, p. 3.) One or more specimens in Lambert's collection similar to the <i>colorada</i></p> <p><i>C. Condaminæ, α</i> vera. (One specimen in Pavon's collection marked "<i>Cinchona</i> sp. nov. inedita Flor. Per. a Loxa.) Lambert has written in pencil. "<i>Condaminæ</i>." Also another marked "<i>Cinchona</i> sp. nov. inedita de Loxa, Quito, Peru."</p> <p><i>Cinchona Condaminæ β</i> Candolii</p> <p><i>Cascarilla magnifolia</i>, Weddell; three specimens in the herbarium</p> <p><i>Cinchona Humboldtiana</i>; arranged under this title are two specimens, marked "<i>Cinchona</i> species nova de Jaen de Loxa."</p> <p><i>Cinchona mierantha</i>.—Weddell</p> <p><i>Cinchona nitida</i>.—Wed. Two specimens in one sheet of the herbarium, one exactly that of Flor. Peruv., the other is <i>C. Condaminæ</i> of Humboldt, and so marked by Lambert. Two on another sheet, one of <i>nitida</i>, one of <i>Condaminæ</i></p>	<p>"Cusco"</p> <p>Very fine crown bark</p> <p>"Rusty crown" bark (Huamancas bark of the Germans), also "corky crown"</p> <p>Ordinary Loxa, fine straight quills</p> <p>Imported to a loss in 1849-50</p> <p>Comes probably as "crown"</p> <p>Huanuco bark, coarse pieces</p> <p>Fine grey bark</p>	<p>Quinquina jaune de la Condaminæ</p> <p>Quinquina Huamancas ferugineux</p> <p>Q. gris fin de Lima. H.D., III., 10</p> <p>Quinquina nova ordinaire. H. D., III., 161</p> <p>... ..</p> <p>... ..</p> <p>... ..</p> <p>Quinquina rouge de Lima, H.D. III., 120</p>	<p>Ditto.</p> <p>A smoother <i>Condaminæ</i> bark than the <i>Uritungas</i>, the parallel cracks forming imperfect rings. This bark is said to have been the one which cured the Countess of Chinchon. (See Lindley, <i>Flor. Med.</i>, p. 415.)</p> <p>Some pieces, like dark Jaen bark, with black sooty patches, others like No. 4</p> <p>The bark varies much in colour. It is the <i>amarilla</i> of Ruiz, according to Humboldt, but De Candolle seems to doubt this appellation.</p> <p>Quilled transverse cracks, fibrous, moderately heavy, something like lancifolia.</p> <p>True Huanuco bark.</p> <p>The <i>Quinacana legitima</i>, or true grey bark. Laubert. The substance cinnamon-colour, the derm purple marked resinous circle, coarse fibre.</p>
<p>20 C. purpurea Fl. Peruv.</p> <p>C. quina amarilla fina del Rey, de Loxa</p>	<p>In general without cracks." (Pereira)</p> <p><i>C. amarilla</i>. Fol. obovatis, acuminatis, floribus internis inaequalibus (Laubert à Tafalla)</p> <p>"C. species nova, inedita, vernacule <i>chaharguera</i>."</p> <p><i>C. chaharguera</i> nom indien. Fol. glandulosus laucolatis sub-rotundis, capsulis ovalibus. (Laubert à Tafalla)</p> <p>Fol. floralibus ovatis; floribus interneris purpureis</p> <p>"The outer surface of the derm is purple-brown, showing like reddish birch bark" (Pereira)</p> <p>Facies C. Condaminæ, at diversissima (Laubert)</p> <p>Compare Nos. 17, 23, *50, and *18</p> <p>"La Peruviana" of Laubert. B. de Ph., II., 295</p>	<p>and another, <i>Cinchona purpurea</i> affinis sp. nov. inedita Fl. Peruv., which looks like the var. <i>Peltetiana</i></p> <p><i>C. lutea</i> Pavon., Fol. ovatis utrinque acutis, floribus majoribus.—(Lambert, p. 3.) One or more specimens in Lambert's collection similar to the <i>colorada</i></p> <p><i>C. Condaminæ, α</i> vera. (One specimen in Pavon's collection marked "<i>Cinchona</i> sp. nov. inedita Flor. Per. a Loxa.) Lambert has written in pencil. "<i>Condaminæ</i>." Also another marked "<i>Cinchona</i> sp. nov. inedita de Loxa, Quito, Peru."</p> <p><i>Cinchona Condaminæ β</i> Candolii</p> <p><i>Cascarilla magnifolia</i>, Weddell; three specimens in the herbarium</p> <p><i>Cinchona Humboldtiana</i>; arranged under this title are two specimens, marked "<i>Cinchona</i> species nova de Jaen de Loxa."</p> <p><i>Cinchona mierantha</i>.—Weddell</p> <p><i>Cinchona nitida</i>.—Wed. Two specimens in one sheet of the herbarium, one exactly that of Flor. Peruv., the other is <i>C. Condaminæ</i> of Humboldt, and so marked by Lambert. Two on another sheet, one of <i>nitida</i>, one of <i>Condaminæ</i></p>	<p>"Cusco"</p> <p>Very fine crown bark</p> <p>"Rusty crown" bark (Huamancas bark of the Germans), also "corky crown"</p> <p>Ordinary Loxa, fine straight quills</p> <p>Imported to a loss in 1849-50</p> <p>Comes probably as "crown"</p> <p>Huanuco bark, coarse pieces</p> <p>Fine grey bark</p>	<p>Quinquina jaune de la Condaminæ</p> <p>Quinquina Huamancas ferugineux</p> <p>Q. gris fin de Lima. H.D., III., 10</p> <p>Quinquina nova ordinaire. H. D., III., 161</p> <p>... ..</p> <p>... ..</p> <p>... ..</p> <p>Quinquina rouge de Lima, H.D. III., 120</p>	<p>Ditto.</p> <p>A smoother <i>Condaminæ</i> bark than the <i>Uritungas</i>, the parallel cracks forming imperfect rings. This bark is said to have been the one which cured the Countess of Chinchon. (See Lindley, <i>Flor. Med.</i>, p. 415.)</p> <p>Some pieces, like dark Jaen bark, with black sooty patches, others like No. 4</p> <p>The bark varies much in colour. It is the <i>amarilla</i> of Ruiz, according to Humboldt, but De Candolle seems to doubt this appellation.</p> <p>Quilled transverse cracks, fibrous, moderately heavy, something like lancifolia.</p> <p>True Huanuco bark.</p> <p>The <i>Quinacana legitima</i>, or true grey bark. Laubert. The substance cinnamon-colour, the derm purple marked resinous circle, coarse fibre.</p>
<p>2 C. purpurea Fl. Peruv.</p> <p>C. quina amarilla fina del Rey, de Loxa</p>	<p>In general without cracks." (Pereira)</p> <p><i>C. amarilla</i>. Fol. obovatis, acuminatis, floribus internis inaequalibus (Laubert à Tafalla)</p> <p>"C. species nova, inedita, vernacule <i>chaharguera</i>."</p> <p><i>C. chaharguera</i> nom indien. Fol. glandulosus laucolatis sub-rotundis, capsulis ovalibus. (Laubert à Tafalla)</p> <p>Fol. floralibus ovatis; floribus interneris purpureis</p> <p>"The outer surface of the derm is purple-brown, showing like reddish birch bark" (Pereira)</p> <p>Facies C. Condaminæ, at diversissima (Laubert)</p> <p>Compare Nos. 17, 23, *50, and *18</p> <p>"La Peruviana" of Laubert. B. de Ph., II., 295</p>	<p>and another, <i>Cinchona purpurea</i> affinis sp. nov. inedita Fl. Peruv., which looks like the var. <i>Peltetiana</i></p> <p><i>C. lutea</i> Pavon., Fol. ovatis utrinque acutis, floribus majoribus.—(Lambert, p. 3.) One or more specimens in Lambert's collection similar to the <i>colorada</i></p> <p><i>C. Condaminæ, α</i> vera. (One specimen in Pavon's collection marked "<i>Cinchona</i> sp. nov. inedita Flor. Per. a Loxa.) Lambert has written in pencil. "<i>Condaminæ</i>." Also another marked "<i>Cinchona</i> sp. nov. inedita de Loxa, Quito, Peru."</p> <p><i>Cinchona Condaminæ β</i> Candolii</p> <p><i>Cascarilla magnifolia</i>, Weddell; three specimens in the herbarium</p> <p><i>Cinchona Humboldtiana</i>; arranged under this title are two specimens, marked "<i>Cinchona</i> species nova de Jaen de Loxa."</p> <p><i>Cinchona mierantha</i>.—Weddell</p> <p><i>Cinchona nitida</i>.—Wed. Two specimens in one sheet of the herbarium, one exactly that of Flor. Peruv., the other is <i>C. Condaminæ</i> of Humboldt, and so marked by Lambert. Two on another sheet, one of <i>nitida</i>, one of <i>Condaminæ</i></p>	<p>"Cusco"</p> <p>Very fine crown bark</p> <p>"Rusty crown" bark (Huamancas bark of the Germans), also "corky crown"</p> <p>Ordinary Loxa, fine straight quills</p> <p>Imported to a loss in 1849-50</p> <p>Comes probably as "crown"</p> <p>Huanuco bark, coarse pieces</p> <p>Fine grey bark</p>	<p>Quinquina jaune de la Condaminæ</p> <p>Quinquina Huamancas ferugineux</p> <p>Q. gris fin de Lima. H.D., III., 10</p> <p>Quinquina nova ordinaire. H. D., III., 161</p> <p>... ..</p> <p>... ..</p> <p>... ..</p> <p>Quinquina rouge de Lima, H.D. III., 120</p>	<p>Ditto.</p> <p>A smoother <i>Condaminæ</i> bark than the <i>Uritungas</i>, the parallel cracks forming imperfect rings. This bark is said to have been the one which cured the Countess of Chinchon. (See Lindley, <i>Flor. Med.</i>, p. 415.)</p> <p>Some pieces, like dark Jaen bark, with black sooty patches, others like No. 4</p> <p>The bark varies much in colour. It is the <i>amarilla</i> of Ruiz, according to Humboldt, but De Candolle seems to doubt this appellation.</p> <p>Quilled transverse cracks, fibrous, moderately heavy, something like lancifolia.</p> <p>True Huanuco bark.</p> <p>The <i>Quinacana legitima</i>, or true grey bark. Laubert. The substance cinnamon-colour, the derm purple marked resinous circle, coarse fibre.</p>
<p>36 C. purpurea Fl. Peruv.</p> <p>C. quina amarilla fina del Rey, de Loxa</p>	<p>In general without cracks." (Pereira)</p> <p><i>C. amarilla</i>. Fol. obovatis, acuminatis, floribus internis inaequalibus (Laubert à Tafalla)</p> <p>"C. species nova, inedita, vernacule <i>chaharguera</i>."</p> <p><i>C. chaharguera</i> nom indien. Fol. glandulosus laucolatis sub-rotundis, capsulis ovalibus. (Laubert à Tafalla)</p> <p>Fol. floralibus ovatis; floribus interneris purpureis</p> <p>"The outer surface of the derm is purple-brown, showing like reddish birch bark" (Pereira)</p> <p>Facies C. Condaminæ, at diversissima (Laubert)</p> <p>Compare Nos. 17, 23, *50, and *18</p> <p>"La Peruviana" of Laubert. B. de Ph., II., 295</p>	<p>and another, <i>Cinchona purpurea</i> affinis sp. nov. inedita Fl. Peruv., which looks like the var. <i>Peltetiana</i></p> <p><i>C. lutea</i> Pavon., Fol. ovatis utrinque acutis, floribus majoribus.—(Lambert, p. 3.) One or more specimens in Lambert's collection similar to the <i>colorada</i></p> <p><i>C. Condaminæ, α</i> vera. (One specimen in Pavon's collection marked "<i>Cinchona</i> sp. nov. inedita Flor. Per. a Loxa.) Lambert has written in pencil. "<i>Condaminæ</i>." Also another marked "<i>Cinchona</i> sp. nov. inedita de Loxa, Quito, Peru."</p> <p><i>Cinchona Condaminæ β</i> Candolii</p> <p><i>Cascarilla magnifolia</i>, Weddell; three specimens in the herbarium</p> <p><i>Cinchona Humboldtiana</i>; arranged under this title are two specimens, marked "<i>Cinchona</i> species nova de Jaen de Loxa."</p> <p><i>Cinchona mierantha</i>.—Weddell</p> <p><i>Cinchona nitida</i>.—Wed. Two specimens in one sheet of the herbarium, one exactly that of Flor. Peruv., the other is <i>C. Condaminæ</i> of Humboldt, and so marked by Lambert. Two on another sheet, one of <i>nitida</i>, one of <i>Condaminæ</i></p>	<p>"Cusco"</p> <p>Very fine crown bark</p> <p>"Rusty crown" bark (Huamancas bark of the Germans), also "corky crown"</p> <p>Ordinary Loxa, fine straight quills</p> <p>Imported to a loss in 1849-50</p> <p>Comes probably as "crown"</p> <p>Huanuco bark, coarse pieces</p> <p>Fine grey bark</p>	<p>Quinquina jaune de la Condaminæ</p> <p>Quinquina Huamancas ferugineux</p> <p>Q. gris fin de Lima. H.D., III., 10</p> <p>Quinquina nova ordinaire. H. D., III., 161</p> <p>... ..</p> <p>... ..</p> <p>... ..</p> <p>Quinquina rouge de Lima, H.D. III., 120</p>	<p>Ditto.</p> <p>A smoother <i>Condaminæ</i> bark than the <i>Uritungas</i>, the parallel cracks forming imperfect rings. This bark is said to have been the one which cured the Countess of Chinchon. (See Lindley, <i>Flor. Med.</i>, p. 415.)</p> <p>Some pieces, like dark Jaen bark, with black sooty patches, others like No. 4</p> <p>The bark varies much in colour. It is the <i>amarilla</i> of Ruiz, according to Humboldt, but De Candolle seems to doubt this appellation.</p> <p>Quilled transverse cracks, fibrous, moderately heavy, something like lancifolia.</p> <p>True Huanuco bark.</p> <p>The <i>Quinacana legitima</i>, or true grey bark. Laubert. The substance cinnamon-colour, the derm purple marked resinous circle, coarse fibre.</p>

No.	Vernacular Name according to Pavon.	Description by other Writers.	Botanical Name and Specimens.	English Commerce.	Guibourt's Histoire des Drogues.	Remarks.
45	C. acutifolia, Fl. Peruv.	(A) Collection Delessert.	{ Cascarilla acutifolia, Weddell, one specimen in the museum marked <i>Cinchona acutifolia</i> . }	Not known	{ Quinquina ^a feuilles aigues de Ruiz. H.D., III, 166. }	{ Grey bark, externally, with pink-red sub- stance, internal sur- face chocolate. }
46	C. amarilla a Ynta sp. nova.	{ Cascarilla amarilla de Hinta y de Chito (of Delessert's collection) C. amarilla del Juta (Laubert). }	{ Cinchona lutea, Pavon. Several specimens in the herbarium of Pavon (varieties of <i>Condaminea</i> ε pitayensis?). }	{ Comes from New Granada ..... }	... ..	{ A light-coloured Pitaya bark. }
47	C. negra de [Azogues de] Loxa. 2 ^o espece de Loxa. See No. 37	{ C. negra, 2d species. Fol. floralibus subcordatis, glandulosis, floribus purpureis. (Laubert á Tafalla.) }	{ C. Condaminea β Candolii Cin- chona heterophylla, Pavon MSS. "C. negra del pueblo de los azogues de Loxa" (Collection Delessert, P.) }	Blackish inferior Loxa	{ Loxa inferieur, H.D., III, 103. "Cet coecore est recue de- puis plusieurs annees dans le commerce, comme Q. de Loxa Quina de Lima blanc. H. D., III, 111. Quinquina de Loxa rouge fibreuse du Roi d'Espagne. H.D., III, 105. }	{ Loxa bark, in twisted pieces, covered with crustaceous and other lichens. }
48	C. quina con hojas de Zambo de Loxa .....	... ..	{ A variety of <i>lucumefolia</i> in ap- pearance }	{ Would be called "crown bark" }	... ..	{ Fibrous as <i>C. lancifolia</i> ; substance brown and harsh. }
49	C. quina estoposa de Loxa ...	{ C. stupea, Pavon, MSS. (Lagar- tijada of Laubert?) }	{ C. Condaminea, var. One speci- men marked "vulgo cascarilla estoposa," also "Cinc. stupea inedita". }	{ Comes with "ashy crown bark" }	... ..	{ A <i>lancifolia</i> bark. }
50	C. quina blanca pata de Gal- linazo. 1 ^a espece.	{ "Fol. lancolatis, glandulosis, pe- tiolo, nervoq. centrali san- guineis," Laubert á Tafalla }	{ Cinchona suberosa, Pavon MSS. Collection Delessert. (D.) }	{ "Pale bark," That in the Collection De- lessert is <i>corky pate bark</i> }	... ..	{ The bark resembles the <i>Provinciana</i> , or <i>Ita- gruico</i> . It has a greenish epiderm, and a <i>rusty</i> look. }
51	C. vulgo provinciana, sp. nova de Loxa	Agrees with Poeppig's specimens ...	{ Cinchona micrantha, Ruiz and Pavon. One specimen marked Cinchona micrantha, sp. nov. edita. Flor. Poruv. in Peru An- dium nemonibus }	{ A similar speci- men, recently sent from Peru under this name to Dr. Weddell..... }	Q. gris de Lima, ou q. Huauuco (written in pen- cil by M. Gui- bourt)	{ Heavy bark, pieces ten inches long, with the coat of <i>Lima bark</i> ; some wrinkled, some with cross cracks; no resinous circle, rusty looking, with greenish epiderm. }
XI	C. colorada de Huaranda, sp. nov. inedita es buena (Huaranda, a mountain of Loxa)	{ On the other side of the wrapper marked <i>Quina colorada del Key</i> , de Loxa }	{ Cinchona succirubra (Collection Delessert) from Pavon MSS..... }	Commercial red bark	{ Quinquina rouge non ver- ruqueux, H.D., III, 121. }	{ Contaminea coat ex- foliating, showing various crater-like de- pressions, quite the red bark of commerce. }

30	C. cascarilla colorada de los Azogues de Loxa	{ C. colorada. Foliis inaequaliter ovatis, acuminatis, nervosis, glandulosis, floribus, interne bicoloribus, capsulis, virescentibus (Laubert à Tafalla?) this, or No. 33 The wood bears this inscription, "C. colorada de Loxa, distincta especie." See No. 17	{ C. Condaminea var.? [The bark missing in the collection] .....	... ..	{ The bark on the wood is like the Q. colorada del Rey.
35	C. cascarilla colorada de Loxa .....	... ..	[The bark missing in the collection]	... ..	{ The wood has a smooth bark, marbled with lichens, and detached with great facility. Greenish wrinkled Huaneño bark, coat easily exfoliates.
18	C. ease. Provinciana de Jaen de Loxa .....	... ..	Cinchona mierantha. R. and P.....	... ..	{ The bark on the wood very rugged, grater-like surface, colour quite black. The specimen of <i>flat</i> in the Collection Delessert strongly resembles <i>Calisaya</i> in structure and in the coat.
37	Casc. amarilla de Loxa .....	... ..	[The bark is missing]	... ..	{ Bark on the wood like No. 4.
21	C. cascarilla amarilla Uritusinga (Uritusinga, a mountain near Loxa)	{ Quina selectissima de Loja, C. uritusinga (Pavon)	{ C. econdaminea, α vera, Weddell (<i>acadenica</i> of Guibourt, as having been figured by La Condamine).....	{ Quinquina jaune du Roi d'Espagne. H. D., III., 129	{ Moderately small quills, transverse cracks, but not very numerous. Pereira.
	C. cascarilla amarilla del Rey, de Loxa	{ Foliis lanceolatis glandulosis obscure virescentibus pctiolo nervoque centrali sanguineis flore rubro. (B. de Ph., III., 294, Laubert à Tafalla)..... "C. <i>erespilla mala</i> (<i>crepue</i> , frisée). Fol. ovato-lanceolatis obscure virescentibus, capsulis ferrugineis. (Laubert à Tafalla)	[The bark is missing]	... ..	{ The bark on the wood like No. 4.
10	C. erespilla mala de macos (probably macacos, monkeys)	{ The kind figured by Humboldt. See De C. Fr. IV., 352	{ Cinchona Condaminea, α vera. Weddell .....	... ..	{ The bark on the wood like No. 4.
	Quina chaharguera de Loxa (See No. 36) .....			... ..	{ The bark on the wood like No. 4.

No. Bark Wood	Vernacular Name according to Pavon.	Description by other Writers.	Botanical Name and Specimens.	English Commerce.	Guibourt's Histoire des Drogues.	Remarks.
**1	<i>C. viridiflora</i> , sp. nova del Peru, inedita	{ Marked <i>C. de flor verde</i> on the bark } in <i>D. Don's hand</i>	Casearilla?	Unknown	... ..	{ The small quills resemble <i>C. ovata</i> , but are more brittle, rigid fibre like a casearilla. }
**2	Ditto	A second Specimen	... ..	"Cusco" .....	... ..	{ Agrees with Weddell's specimens. }
**3	<i>C. purpurea</i> Fl. Peruv.....	See Nos. 19 and 34 .....	... ..	... ..	{ Gris pale aneien } H.D. III., 152 }	{ No doubt the Casearillo pallido of the Quinologia, the <i>C. pallescens</i> Ruiz. See <i>De Cand. Prod.</i> IV., 353. }
**4	<i>C. ovata</i> flor. Peruv.....	(Similar to No. 31)	{ <i>Cinchona ovata</i> , Weddell. One specimen in the herbarium marked <i>e edita</i> . <i>C. purpurea</i> R. & P. <i>pubescens Vahl</i> . β <i>inedita</i> . γ <i>cordifolia</i> , <i>Mutis</i> . <i>Secundum Mutisii iconem inedit</i> , <i>ni vehementer fallor</i> . γ <i>inedita</i> . }	{ Resembles in degree eordifolia }	{ <i>Llamada</i> "provineta," H.D., III., 106..... }	{ Extremely tough fibre, and peculiar microscopic structure. }
**5	<i>C. globosa</i> , sp. nova inedit. } de Loxa	"Small fibrous." See No. 82	{ <i>Cinchona globifera</i> , Pavon. <i>Nauclea</i> ? <i>Cinchonæ</i> , in <i>De Cand. Prod.</i> IV., 345..... }	Comes mixed with other barks .....	... ..	{ Resembles <i>C. purpurea</i> but more brittle—rigid fibre. }
**6	<i>Quina blanca</i>	"Short quills, whitish externally" } (Perreira)	{ <i>Casearilla macrocarpa</i> .—Weddell. Three specimens in the herbarium	{ Comes occasionally, but not in quills..... }	"Quingina blanc de Mutis ecore de son ovalifolia,"—G. (Written in pencil)	{ White quills, with odd corky bumps, agrees with the specimens of <i>C. pubescens</i> . }
**7	<i>C. amarilla</i> de Chito sp. nov. inedita. See No. 21	{ The amarilla of Fortin's collection, Guibourt, III., 107)	{ <i>Cinchona eordifolia</i> , specimen β " <i>Cinchona</i> sp. <i>nova inedita de Loxa Quito Peru</i> ." <i>C. pubescens</i> , var. <i>purpurea</i> (Weddell) ... }	Unknown	{ <i>Quingina Loxa</i> ecore. H.D., III., 107..... }	{ Straight smooth quills red colour. }
**8	<i>C. quina Azahar macho</i> de Jaen Loxa	{ <i>M. Guibourt</i> considers it the <i>C. acutifolia</i> (No. 45)	<i>Casearilla Riveroana</i> .—Weddell	Not known .....	... ..	... ..

ABSTRACT OF PAVON'S THREE LISTS IN THE HANDWRITING OF PAVON.

N.B. The titles are not repeated when they are the same in the three lists.

FIRST LIST.	SECOND LIST.	THIRD LIST.
VIII.	1. C. vulgo Azaharito de Loxa *16. 2. C. crespilla de Jaen de Loxa *14. *27. 3. C. fina de Loxa. 4. C. Quiebro de Cuena de Loxa *25. 5. C. vulgo Taron—taron de Loxa *34. 6. C. vulgo Puchon de Loxa 7. C. magnifolia (flor d'Azahar, vulgo) 8. C. rosca, Fl. Per. 9. C. con hojas rugosas de Loxa *9. 10. C. con hojas de Lucuma, 2º esp. de Loxa *22. C. casc. crespilla de Loxa. O+11. C. quina crespilla de Loxa *15. 12. C. margarita v. de Loxa *11. 13. C. quina con hojas de Roble de Loxa. 14. C. laccifera del Peru, p. a la roxa de Mutis 15. C. azahar macho v. de Loxa *3. 16. C. pata de Gallinazo, v. 2º esp. de Loxa *17. 17. C. provinciana v. de Loxa. 18. C. azahar hembra v. de Jaen de Loxa 19. C. casc. crespilla ahumada de Loxa. *13. 20. C. casc. colorada de Jaen, Loxa 21. C. casc. amarilla di Cito, Loxa *36. 22. C. casc. crespilla de latuna de Loxa *10. 23. C. quina p. a la amarilla de Mutis 24. C. quina p. a la buena de Loxa. *24. C. casc. crespilla p. a la buena de Loxa. 25. C. quina con hojas un poco vellosas de los Azogues } de Loxa. } 26. C. casc. de Nagenal Loxa 27. C. casc. serrana de Huaranda, Loxa	
XII. C. socchi, p. a la quina roxa de Mutis		
XVI. C. sp. nov. ined. de Loxa, vulgo provinciana, } es buena		
XXII. C. colorada de Jaen, sp. nov. inedit, es buena.		
XIX. C. amarilla de Chito, sp. nov. de Loxa, es } buena, inedita		

FIRST LIST.

- XIV. C. rotundifolia, sp. nov. inedit. de Loxa
- IV.
- V.
- XX. C. colorada del Rey, sp. nov. inedit. de Loxa, }
 es buena
- III.
- XVII. C. amarilla fina del Rey de Loxa, *es buena*
- XV. C. sp. nov. inedit. vernacule chaharguera, *es buena*
- I.
- VI.
- VII.
- IX.
- X.
- II.
- XIII.
- XVIII. C. amarilla de Ynta, sp. nov. de Loxa, sp. nov. }
 inedit.

- XXI. Colorada de Huaranda, sp. nov. inedit. de Loxa, }
 es buena
- MADRID, 1° de Enero, de 1817.

[N.B. In this first list, Pavon appears to have designated as *good kinds* ("es buena") the following:—
 No. 16. *Cinchona micrantha*
 19. C. pubescens
 20. C. Condaminea colorada del Rey
 17. C. Condaminea amarilla del Rey
 15. C. Condaminea chaharguera
 7. C. nitida
 2. ?]

SECOND LIST.

- 28. C. casc. con hojas de lucuma, 1ª especie.....
- +29. C. con hojas de Palton de Loxa
- 30. C. con hojas redondas de Queibro de Loxa.....
- 31. C. ovata v. p. de Gallereta e casc. boys del Peru.....
- 32. C. globosa, v. aculeata, de Guayaquil.....
- 33. C. quina colorada del Rey de Loxa
- 34. C. purpurea del Peru
- 35. C. quina amarilla fina del Rey de Loxa
- 36. C. casc. chaharguera, v. de Loxa
- 37. C. quina negra, 1ª esp. de Loxa
- 38. C. magnifolia, Fl. Per. de Pavon
- 39. C. sp. nova de Jaen, Loxa
- 40. C. sp. nov. p. la naranjada de Mutis, del Peru.....
- +41. C. nitida, Fl. Per.
- +42. C. lanceolata, Fl. Pei.
- +43. C. hirsuta, Fl. Per. del Peru
- +44. C. sp. nov. inedita de Loxa.....
- 45. C. acutifolia, Fl. Per. de Peru
- 46. C. quina amarilla de ynta de Loxa.....
- 47. C. cascarrilla negra de Loxa, 2ª esp.....
- 48. C. quina con hojas de Zambo de Loxa.....
- 49. C. quina estoposa de Loxa
- 50. C. quina buena p. de Gallinazo, v. de Loxa.....
- +51. C. quina crespilla de Loxa.....
- +52. C. cava q. crespilla de Loxa.....
- +53. C. pata de Gallinazo de Loxa.....

[Those barks missing in the Museum are marked thus +, but the addition of O, shows they are represented in the collection of woods.]

THIRD LIST.

- *35. Esp. do Loxa
- { *8. C. casc. colorada del Rey de Loxa, distinta especie
- *32.
- *20. C. casc. oficial, C. nitida, del Peru
- *4.
- *12.
- *28.
- + * 5. C. casc. colorada de los Azogues de Loxa, distinta esp.
- + * 6. C. casc. colorada de Loxa, distinta especie
- + * 7. C. casc. colorada, distinta esp. de Loxa
- + *33. *18. C. casc. Provincialiana de Jaen de Loxa
- + *19. C. casc. amarilla de Loxa.
- + *21. C. casc. negra, 2ª esp. de Loxa
- + *23. C. casc. de Queibro de Loxa
- + *26. C. casc. amarilla Uritisinga de Loxa
- + *29. C. casc. amarilla del Rey de Loxa
- + *30. C. casc. azahar hembra de Loxa
- + *31. C. casc. crespilla mala de niteos.

Tafalla's table, as published both in the *Bulletin* and in Lambert's work, is (as Dr. Lindley observes) useless, owing to the gross mistakes evident in the Latin names of species; but this is set right by a very obvious *restoration*. It is clear that the table could never have been constructed in its present form, but some unskilful hand has added the *brackets*, which are *evidently* foreign to the original design, and the same hand has brought down the name of the species from the *first* vernacular name against which *alone* it was originally placed, to the centre of the bracket, and thus made it include the most palpable mistakes. There is internal evidence that the corrector of the press did not even understand Latin. I have, therefore, taken the observations of Tafalla, which are valuable, and omitted all reference to the Latin names thus appended in error.

The general result of the investigations which have recently been prosecuted with so much success in this particular branch of science, has been the demonstration of the great benefit of botanical arrangement as indispensable to the knowledge of pharmaceutical products, and to the correct use of those of medicine. It is now generally admitted, that the genus *Cinchona* (as defined by Dr. Weddell), comprehends all the barks at present available for medicinal purposes; the genus *Cascarilla*† and other allied genera not hitherto furnishing any product which has been *legitimately* applied to use in medicine.

I express myself thus guardedly, because it is but too certain that these allied products are also introduced into consumption in considerable quantities. It is, therefore, important to distinguish the spurious from the true medicinal barks, and I believe this can only be effected by the practical application of botanical knowledge.

I purpose to place before the reader my observations on the spurious barks included in Pavon's list, and, in the mean time, to make some remarks on the mode of distinction by *colours*, and by the names of *places*.

1. *Observations on the Colours of Barks.*

The botanists of New Granada (Mutis and Zea) distinguished their four species by the names *orange-coloured*, *yellow*, *red*, and *white*, in imitation (partly) of the previously known barks of Peru. But it so happens, that the *yellow* of Sta. Fé is not at all the yellow of Peru, and if possible, even less is it the "yellow bark" of British commerce. The *red* designation was equally unfortunate as to its identification with the *red bark* of Peruvian commerce, for the *purple-red*, *C. oblongifolia* of Sta. Fé had before obtained the appellation of *yellow* from the Peruvian botanists. The *white* was the only one which partially coincided in New Granada and in Peru, and this is no genuine bark at all, but the worthless *Cascarilla macrocarpa*.

The confusion thus introduced has been perpetuated, and because the *yellow bark* of Mutis was the produce of *C. cordifolia*, therefore the *yellow bark* of commerce‡ was supposed to be *cordifolia bark*, and since the *red bark* of Mutis was the product of *Cinchona* (now *Cascarilla*) *oblongifolia*, the *red bark* of commerce,§ was named in error, *oblongifolia* also.

I conclude that the authority of a great *name* (that of Mutis) first gave currency to these errors, but perhaps something was owing to the more *intelligible* character of the distinctions which he established.

These botanists of Sta. Fé named their barks from *the colour of the substance of the bark as shown in the powder*, and this feature is easily noticed by any observer.

But this was not by any means the case with the botanists of Peru, who indeed only followed the law of *custom*, which had previously established other marks of designation. Thus the distinction first made between *red* (*colorada*) and *yellow* (*amarilla*) in the king's barks of Loxa, was, to common observers, a distinction

† It seems greatly to be regretted that this name, so sure to mislead the student, is not exchanged for some other which would convey no false idea.

‡ The produce of *Cinchona Calisaya*. § The source still unknown.

almost without a difference, and probably, simply the result of the *macho* and *hembra* varieties of the same tree. Then they had also two or three other *yellow* barks which were not *king's* barks, the spurious *yellow* mentioned above (from *casearilla oblongifolia*), the *yellow* of Chito (from *C. pubescens*), and the *yellow* of Loxa (from *C. Condaminea* β *Candolii*), besides the *yellow* of Cuenca, the product (according to Weddell, *Hist.*, p. 74 and 72) of *Lasionema Humboldtianum*. It is pretty clear that none of these barks would have been named by the Sta. Fé botanists *yellow*, and those which they *would* have called *yellow* (following the colour of the *substance*), were quite otherwise designated.† It will be observed that the Peruvian botanists had *several* red barks in addition to the *king's* red. Now, as the *king's yellow* and *red* had the prestige of celebrity in Spain, it was necessary for Mutis to produce *yellow* and *red* bark fit for the king, from New Granada, and he accordingly named the "*oblongifolia*" bark, *red* (*roxa*), though otherwise he would have given it a more appropriate appellation.

Then the "grey bark of commerce, if named according to the system of Mutis, would certainly have been the "cinnamon-coloured bark," for Ruiz and Pavon say (in their *Suplemento*, p. 47), the barks of *nitida* have a red colour like cinnamon, and assert that *all* the barks coming from Loxa valued for royal use including, of course, the red and yellow king's barks, had this peculiar colour of the substance.‡ The best portion of that which we now call "grey bark," is called by M. Guibourt "Red bark of Lima."

Moreover, our term "grey," as given to the bark on account of the crustaceous lichens which cover it, is but an imperfect translation of the Spanish *Quina cana*, which implies the aspect of a head silvered over with age, *white* rather than *grey*.

The term *pale bark* coincides with the Spanish *casarillo palido*, but the precise meaning of "palido" seems to be *yellowish-white*, which is correct as to the produce of *C. ovata*, but *in another and quite different sense*, which is thus explained by these botanists themselves.

"The external colours of the cinchona are not accidental. * * In these, as in all other trees, there are commonly external colours, one natural and proper to each species, and *different from that which proceeds from the lichens*, or small cryphogamous plants which grow on its trunks and boughs, and cause those patches with which the natural colours are varied; as is seen in the *Populus alba* or white Poplar, in the *Populus tremula* or aspen, and in the *Populus nigra*, or black Poplar; in the *Ulmus campestris* or common elm, and in the *Ulmus pumila*. And though the natural colour may vary somewhat by reason of soil and climate, this will only be into a more or less lively shade, or in being spotted with a variety of lichens, so that, notwithstanding these accidental circumstances, the botanist, or even the most rustic labourer may learn to distinguish the species of tree, as the white or black Poplar. The *Quinas finas* of Loxa, and the other Peruvian sorts, have always presented *the same external colour*, although spotted with various lichens.

"According to this incontrovertible principle, *the external colours of the barks of the cinchonas*, although not sufficient by themselves, as you insinuate whilst speaking of their internal colours, are not, on the other hand, of so little importance as Dr. Mutis and yourself (Zea) have imagined. Our barks, as well as those of Santa Fé, not only differ from each other by the internal colours, but by the external and by the remaining marks or characters which present notable differences."—*Suplemento*, p. 58.

It must therefore be borne in mind, that bark may be named either from the

† "The barks of *nitida* have a red colour like cinnamon, a bitter more grateful than that of the *lanceolata*, and not so pungent. The internal colour of the *lanceolata* is a *clear buff, golden yellow*."—*Suplemento*, p. 47.

This bark, very similar to the *orange-coloured* of Mutis, was named "lampigna," or "glabra," *smooth* from its outer surface.

‡ "The *Quina naranjada* of Sta. Fé neither is nor can be the *primitiva*, since all the authors of the first times *attribute to it* [the *primitiva*] *the red colour of cinnamon*; and, without intermission, bark of this colour, as of superior quality, has been sent from Loxa to the Royal Pharmacy, and *there is no account that they ever used in it any of the colour of orange, nor of any other yellow more or less deep*."—*Suplemento*, p. 112.

colour which its *powder* makes, which is the method of Mutis and Zea, or from the external peculiar tint of *the coat*, which is that of Ruiz and Pavon, or from the accidental adhesion of white or black *lichens*, a practice which custom has established. The method of the botanists of Sta. Fé, though open to objection†, merits this preference over the second, that it is capable of being generally appreciated, whilst the second is certainly not thus *obvious*, though I believe very *correct*. The third method is altogether deceptive.

There are two more circumstances to be borne in mind in reference to the designation of barks by their colour. The *first* is, that the tints are sometimes not *absolute*, but simply *relative*, as in the case of the *black* (zamba and negra) *yellow* (naranjada and amarilla) and *white* (blanca and pallida) kinds of calisaya. The second is, that the vernacular name is sometimes given from the tint of the tree (*Histoire*, &c. p. 51), as in *cascarilla verde*, *calisaya morada*, *casca. zamba morada*. This remark belongs of course only to the *country* names, and not to those of English commerce. It so happens, however, that the prevailing tint of the tree, as displayed in the flower and leaves, is often traceable also in the bark, and I have seen it curiously reproduced in analysis. It is therefore not surprising that we find in the *calisaya morada* a strong tendency to the "mulberry purple," and in the *cascarilla verde*, to glaucous green.

2. Designation of Barks by the Names of Places.

It would fatigue the reader to study even a portion of the difficulties which arise from this practice. In some cases, as in the "Carthagena," "Lima," and "Arica" bark, the appellation is taken from the place of shipment, where never grew a cinchona tree, in all probability, since the creation. In others, as in Loxa, Huanuco, Huamalies, Jaen, and Carabaya, the name represents very fairly the most esteemed or most prevalent product of the district. But as it is obvious to every one conversant with the subject, that various species grow in almost every locality which furnishes this precious product of nature, there often arises great confusion from two or three kinds being named after the same place. Thus Cusco, the royal city of the Incas, has come to signify almost everything mean and base, for in Peru it is the produce of *C. scrobiculata*, which is so called; in France the *C. pubescens*, var. *Pelletierana*; and in English commerce not only this last, but other barks of similar low estimation. "Carthagena bark" is a general name in English commerce for the produce of *C. lancifolia* and of *C. cordifolia*, and when the product of *C. lanceolata* is shipped from a port on the Pacific, this, from its resemblance to *C. lancifolia*, is also called "Carthagena bark."§ Pitaya bark, so named from an obscure locality, is at one

† Don Francesco Zea says: "The four (barks) which are known at present are the orange-coloured, the red, the yellow, and the white, simple designations *taken from the internal colour of the bark*." On which the authors of the *Suplemento* remark: "The supposition that only four officinal barks are yet known must be understood with respect to those of Sta. Fé, since those used in Spain in medicine are more numerous, so that the names derived from the colours *orange, red, yellow, and white*, can only serve for the four barks of Sta. Fé discovered up to this time. Moreover, the designations taken from colours are in truth simple, but also by themselves very confusing, since there exist different species which have the colour of earmine, more or less vivid, a more or less deep yellow tint, a cinnamon red more or less lively, also buff colour, tawny, bay, &c., more or less conspicuous. They cannot be marks of easy distinction among dealers, nor among professors, neither are the names commonly adopted in commerce of more avail.

"The name *naranjada* belongs to no species, since it must be understood of the colour which oranges have when ripe, and by no means of the various colours which they assume in all stages of growth. The appellation *blanca* is so improperly given, that it can only be called white in respect of the tint (*con respecto a la tinta*), since its interior colour is more or less reddish in some barks, in others of a reddish fawn, and in others it approaches to cinnamon colour."—*Suplemento*, p. 35.

"The term *roxa* is common to the Quina colorada, to the Quinon of commerce, and to the Cinchona laevis of Tafalla, and it corresponds better to these than to the Quina Azahar [the *C. oblongifolia* or red bark of Mutis.]"—*Suplemento*, p. 36.

§ The "brown Carthagena bark" of M. Guibourt, H. D. iii., 126, is, however, *Pitaya* bark, i.e. *Condaminea-pitaya*.

time the product of the *Condaminea* var. *Pitayensis*, at another a variety of *C. lanceifolia*, at another an unknown false *Pitaya* bark, and again at another the *Quina bicolorata* of Brera, the product of a tree wholly foreign to the *Cinchona*, and then the *Piton* bark, though having some resemblance in sound, is entirely a different thing from all these varieties, being the product of *Exostemma floribundum*, and named from a term used in St. Domingo (where it was found) for *the summit of the mountains*. Such are some of the difficulties which attend this subject, difficult enough in itself, without the addition of *extraneous* sources of confusion.

OBSERVATIONS ON THE FALSE BARKS IN PAVON'S COLLECTION.

Barks of the genus *Cascarilla* (Weddell) seem to me to have constituted the "White Quinquinas" of an early period. "The second species at Loxa," according to M. Jos. Jussien, "comprehends the white quinquinas to the number of four; the common character of which, distinct from the preceding, is to have great leaves, rounded and hairy—the flowers red, very fragrant, bristled with hairs in the interior, the fruit long, and the bark *externally* white. In the two former, the bark has the *internal* substance *verging on red*; it is a little bitter, and possesses, when recent, a *very inferior febrifuge property*, which it soon loses. In the two others, it is *all white*, insipid, and without efficacy. These are the kinds the flowers of which exhale the sweetest perfume, by a compensation of nature, which appears to have transported into the flowers the aromatic principles which she refuses to the barks."

1. *Cascarilla magnifolia*. Weddell.

The fragrance of the *Cascarilla magnifolia* is specially noticed by Weddell, who wishes it on that account introduced into our conservatories, and which merited the name "Flor d'Azahar," or "Orange Flower." Under this first head range the following in Pavon's collection:—

No. 7. *C. cascarilla*. Flor de Azahar.

No. 38. *C. magnifolia*. Fl. Peruv.

Some difficulty has arisen in the identification of this bark, from the varying appearance which it presents, but the specimens brought by Dr. Weddell show these all to belong to one tree, which furnishes the *Quina nova* of commerce, a spurious bark which, according to Batka,† "till 1805 maintained its genuineness in the North American trade as *red bark*, and since 1820 in the collections of Denmark as *Cinchona rubra*." I conclude from the description that this is also the *China nova Surinamensis*, of which Buehner says,‡ "this spurious bark, which can be obtained at a very low price, is *generally employed* for adulterating the better sorts, especially the *Calisaya* bark and *Carthagena* bark." No spurious bark that has fallen under my observation has been imported in such large quantities as this, and when reduced to powder its cinnamon colour would cause it easily to be mistaken for a good bark. According to Ruiz,§ it constituted the bulk of the early importations sent by Mutis from St. Fé, and this fact is admitted by his disciple Zea.|| It is therefore possible that the importation of so much worthless bark might cause the *Quina naranjada* to be also looked on with suspicion,

† *Pharm. Journal*, vol. xi., p. 321.

‡ *Ibid.*, vol. xi., p. 167.

§ "To the great prejudice of the royal treasury, the thick bark (cortezones) of the *Roxa* alone entered with absolute preference into his (Mutis's) immense cuttings; then the *amarilla* * * and the *naranjada* or *tumita*, which he did not know till long afterwards, as it continued despised until he began to know the reprobation of his shipments of red barks (cortezones rojos.)"—*Memoria de las Virtudes y usos de la raiz de la Planta Llamada Yallhoj, &c.* Par Don H. Ruiz. Madrid, 1805.

|| "The first species known, which obtained great estimation for its prodigious effects in intermittents, was the *naranjada*. This species being extremely rare, they substituted in its place the barks of the tree which appeared most to resemble it. This was, to the disgrace of those times of ignorance, the *Quina roxa*, the properties of which being then unknown and much different from the *naranjada*, gave occasion to the havoc (los estragos) which history has transmitted to us."—Zea, as quoted by Ruiz, *Suplemento*, p. 36.

and burnt, which seems to have been a practice followed with the inferior barks at Cadiz.† The same fate befel a quantity of the *Quina nova* at Havre a year or two since. Some small specimens came under my notice amongst the first samples of bark sent in the renewed importations made from Santa Fé de Bogota; and it has since been more largely imported from that quarter, and though sold at an extremely low price, has not ceased to come. If named according to the white epidermis, this bark may well range among the *white quinquinas*; if regarded according to the general tint of the outer coat (as in samples given me by Dr. Weddell, and in one from Peru which I obtained from commerce in the year 1838), it may be called, as by Ruiz and Pavon, *amarillo* or *yellow*; if the purple red, or sometimes pomegranate colour of the surface of the derm (denuded of outer coat) be the general character, it may acquire, as it did here, the name "pomegranate bark;" and if the general red coloured substance be considered, it may be named (as it was by Mutis) *roxa* or *red*.‡

I have only to add, in confirmation of a notice by Pelletier and Caventou,§ that this bark (though useless for medicinal purposes) is not without a minute proportion of alkaloid ("en quantité infiniment petite," P. and C.). MM. Pelletier and Caventou obtained about .0015 per cent. of alkaloid, and I have met with a like proportion, soluble in ether, and giving, like quinine, a decided green colour with chlorine and ammonia.

The bark yielded me 4.28 per cent. of kinovic acid.

3. *Cascarilla stenocarpa*.

No. 1. *C. vulgo Azaharito de Loxa*.

4. *Cascarilla acutifolia*.

No. 45. *C. acutifolia*, R. and P.

5. *Cascarilla Riveroana*. Var. *a*.

This is the *C. oblongifolia* of Lambert (but *not* of Mutis), with leaves pubescent on the under side.

No. 15. *C. Azahar Macho de Loxa*. Var. *β*.

No. 18 and *30. *C. Azahar hembra, vulgo de Jaen de Loxa*.

No. **8. *C. quina Azahar macho de Jaen Loxa*.

As these barks are scarcely to be found in commerce, I shall not add to the notices of them already given in the table.

9. *Cascarilla Pavonii*.

This is found among the specimens of wood, No. 17, exhibiting the very peculiar hollow caused by the contraction of the pith, on which account the name *Cinchona cava* was given it by Ruiz and Pavon.

† "The cinchonæ, as other trees, when they begin to fructify, contain without contradiction their juices and principles in a state of maturity. At this epoch the barks are in a fit state to be gathered, as is practised in Caxanua and Uritusinga, mountains of Loxa.

"When the trunks or boughs are covered with multiplied layers of bark, according to the number of years they have attained, the external layers are without succulence, too dry, crusty, hardened and woody-fungous or shrivelled, and the internal parts have sap only in those parts by which the sap or nutritious juice, by means of which the plant grows, ascends or descends, and this smallest part of an old bark (eortezon) is the only useful part, since all the rest is not only useless but hurtful on account of stytieity, or other contrary qualities, which the barks (eortezas) have in their state of perfection, and when they are free from the multitude of extraneous bodies which have adhered to the thick barks (eortezones) for so many years. For this reason they have burnt, by order of the king, on the heights of San Bernard of Madrid, considerable quantities of thick barks (eortezones). The barks of the young branches have not their juices in a state of so great activity as those of medium size which have arrived at the state of maturity, yet it is undeniable that they are more efficacious than the eortezones with so many outer coats, since they are free from so many thick and shrivelled coverings, formed by time and embrowned by the heat of the sun, increased by the lichens and other extraneous bodies, and rotted by the unnumbered rains which have fallen upon them, as happens with the boughs of other trees."—*Suplemento*, p. 41.

‡ "It is beyond contradiction that the *cinchona oblongifolia* of Dr. Mutis constitutes one and the same species with our *cinchona magnifolia*, or *lutescens* of Ruiz."—*Suplemento*, p. 53.

§ *Journ. de Pharm.* for 1821.

18. *Cascarilla macrocarpa*.

No. **6. *Quina blanca*. This has been already sufficiently described by others. Its contents are similar to those of the *Quina roxa*, and the alkaloid (which has been called *Blanquinine*), gives a decided green precipitate with chlorine and ammonia.

No. 12. *C. margarita de Loxa*. Of this I possess a botanical specimen, marked by Pavon "Chinchona var. *Margarita de Jaen*." This was given me by Dr. Weddell as *Cascarilla magnifolia*. It appears, therefore, to be a variety slightly differing (as in the bark, &c.) from the typical form.

Lasionema roseum.

No. 8. *C. rosea del Peru*.

No. 5. *C. cascarilla Taron-taron de Loxa*.

This bark is not now met with in commerce.

Condaminea tinctoria, D. C.

No. 14. *C. laccifera del Peru, p. a la roxa de Mutis*.

This curious bark is described by Guibourt as his *Ecorce de Paraguatan*, of which he has given me a specimen. I have found it in English commerce, but it possesses no peculiar interest, except as viewed with the microscope.

Nauclea Cinchonæ, D. C.

No. 32. *C. globosa, unas de Gato, vel acullata de Guayaquil*.

No. **5. *C. globosa, sp. nova inedit. de Loxa*.

The peculiar toughness of the fibre would prevent its being intentionally mixed with good bark, but it is at times accidentally intermingled.

False (?) barks, origin unknown.

No. 26. *C. cascarilla o quina de Nagenal de Loxa*.

No. 29. *C. cascarilla con hojus de Palton de Loxa*.

No. **1. *C. viridiflora, sp. nov. de Peru, inedita* No. **2. A second specimen of the above.

I have confined my attention, in this survey, to the false barks represented in Pavon's collection. Others are referred to by Condamine in a passage quoted above (vol. xi., p. 492). A bark similar (as to the styptic taste) to the *Alizier* there mentioned is mixed very frequently with the *canuto* of *C. calisaya*, and is probably the product of *Laplacea quino-derma*, Weddell. It has come, but very rarely, with the *tabla*, from which it is more easily distinguished. The *cascarilla carua* is also, I think, frequently intermingled with the *canuto* of *calisaya*.

The characteristic difference noticed by Weddell is, that "in the dry state the *false barks* are in general distinguished with the greatest ease from those rightly called *Quinquinas*, by the hardness and the constant persistence of their cellular tunic, and by the very woody nature of the liber." (*Histoire*, §c., p. 78.)

CONCLUSION.

In bringing to a termination my remarks on the collection of Pavon, it remains for me simply to recal to the reader's notice that I have only touched incidentally on the barks of Bolivia and those of New Granada, which are not represented in this collection. It is evident (as I have in part attempted to show) that some very useful species of bark growing in Peru were known to these botanists, which have since been lost sight of, and which the activity of commerce will probably again rescue from oblivion. As to the different kinds of bark which I have found in commerce and described, I have it in contemplation to present specimens to the museum of Dr. Pereira, that they may remain for permanent reference and illustration of the observations in this series of papers.

Since the above was in type, I have had the opportunity of examining spe-

cimens recently sent by Dr. Winckler to Dr. Pereira, which afford additional elucidation of the names used in Germany.

China Jaen fusca, *China de Para*, contains *paracin*,—is "Para bark."

China Jaen nigricans,—is "Ash bark," produce of *C. ovata*.

China Jaen pallida,—appears to be the quill of *C. Pelletierana*.

China Huamalies,—a brown bark, *partially* resembling "Carabaya bark."

China flava fibrosa,—a brown bark, not now found in commerce, except as mixed with other sorts.

China Huanuco,—inferior Loxa, *not* the "Grey bark" of English commerce.

China rubiginosa opt.,—is the "hard coated ovata" described above.

China nova Surinamensis,—is "Quina nova."

ADDENDA ET CORRIGENDA.

In page 6, *et alia*, for *Quinin* read *Quinidine*.

In page 14, for *Ristolfo* read *Restrepo*.

In page 16, line 6, for *C. lanceolata* of *Mutis* read *lancifolia* of *Mutis*.

In page 24—The coloured base of *C. Pelletierana* so much resembles *paracin* in its properties as to lead me to think them the same. It is, however, a crystallizable substance, and needs further investigation.

It is interesting to consider what is the botanical relationship of *barks containing paracin*, or rather *aricine*—I have already *several kinds* possessing this peculiarity.—See also Riegel's Observations, *Pharm. Journ.*, vol. xii., p. 251.

APPENDIX.

I BEG the reader's special attention to the following remarks by M. Guibourt, which I have translated as literally as I could. Quoting from page 16 above, "This quinquina (the *Amarilla Uritusinga*) is identical with the *Quina selectissima* of the collection Delessert." M. Guibourt observes, "This appears to me very exact, and I add identical also with my *Q. de Loxa jaune fibreux*."

"M. Howard attributes to me, consequently, an opinion which I do not hold, when he says that I describe the *Q. amarilla Uritusinga* as being the *Quinquina de Lima tres rugueux, imitant le Calisaya*. I have only said (p. 113 H. D.) that the specimen in the British Museum, marked *Casc. amarilla fina de Uritusinga* (No. 12 woods) is *Quinquina de Lima tres rugueux*, and this does not mean to say that it ought to be: I think, on the contrary, that this result proceeds from Pavon confounding under the name of *amarilla* many varieties of *condaminea*, or gave the name of *amarilla* to many varieties of *condaminea*. For example, the No. 35 of Pavon, according to its name, *Cascarilla amarilla del rey de Loxa*, ought to be, according to me, *Q. de Loxa jaune fibreux*, and is, so far as I can judge, *Quinquina de Loxa brun compacte*."

July No. p. 13.—"The quotation from Lambert's Illustrations contains two errors [the result of his defective translation]. The first is line 51, *red quinquina* instead of *orange-coloured quinquina*. The second fault is to have made Ruiz say that the *Quinquina resembling the Calisaya* is very different from the *calisaya*, as well as from the *orange-coloured quinquina of Mutis*. Laubert says, on the contrary (B. de Ph., t. xi., p. 304), that the quinquina resembling the *calisaya* perfectly resembles the orange quinquina of Mutis, and that Ruiz was not far from thinking that both belonged to the same species." [In the "Suplemento," however, the contrary opinion is expressed.]

P 24, line 12, "mulberry-leaves" should be "leaves of a mulberry-purple colour."

P. 27, line 37.—The reference to the "*Dunkle Jaen*" should be erased, as I have since ascertained that this is a different bark.

P. 28.—The reader will please refer to the original of the note from the *Quinologia*, this being taken from a German translation, the Spanish not being at hand at the time of insertion.

* * M. Guibourt's numbers were not found attached to the barks, but were adapted by M. G. from Pavon's list, and agree with those given in this work.

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